The New England
Journal of Medicine

VOLUME 209 AUGUST 17, 1933 NUMBER 7

CAUSES OF DEATHS FROM HEAT IN MASSACHUSETTS*

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FOREWORD. A previous study of deaths from heat between 1900 and 1928 in the United States Registration Area and in Massachusetts in particular (Shattuck and Hilferty 1932) led to conclusions, some of which are recapitulated as follows: (a) The distribution of deaths from heat in the United States is very irregular and there are marked fluctuations from year to year.

(b) As a rule, the death-rates are markedly higher in urban than in rural communities and this difference is especially pronounced in years in which deaths from heat have been notably frequent.

(c) The average death-rates by ages are relatively high during the first year of life and very low thereafter up to the age of 20. After this, they rise gradually up to the age of 70. They then begin to rise sharply.

(d) The specific death-rates for males in Massachusetts during the past 30 years are about equal to those for females below 20 years of age, and they are about equal also in the age-period from 70 upward, but between the ages of 20 and 70 the rates for males are about three times as high as for females. The percentage of male as compared with female decedents in Massachusetts during the past 50 years shows a marked downward trend.

(e) In Massachusetts nearly all deaths from heat occur in June, July, or August and the largest number in July.

(f) Meteorological data from Massachusetts for 1901, 1911, 1917, and 1925 when deaths from heat were especially numerous, indicate that unusually high temperature, persisting for several days at a time, was the factor of chief importance rather than unusual humidity or low wind velocity.

(g) The following inferences were drawn tentatively:

1. That the sharp increase of deaths after 20 years of age suggests, as a factor, unfavorable conditions of employment or occupation during the active period of life.

2. That the relatively high proportion of male decedents and the increasing proportion of female decedents is to be similarly explained.

3. Unsuitable clothing was suggested as another factor of probable importance.

4. It was also inferred that the sharp rise of the death-rate after 70 years of age is dependent upon greatly diminished physical vigor.

5. That the high rate for infants under one year of age is due to relatively low vitality; and

6. That the steadily rising rates between the ages of 20 and 70 are due to gradually diminishing vigor.

Plan of Work. The object, at present, is to determine, so far as possible by further analysis of available data, the causes of deaths from heat in Massachusetts. The data are derived mainly from reading the death certificates filed at the State House in the year 1911. In July of 1911 the deaths from heat in Massachusetts were remarkably numerous and most of them occurred during two heat-waves of unusual severity.

The death certificates distinguish two main groups of cases: first, those due primarily to heat and, second, those in which heat was reported as a factor of secondary importance. The primary and secondary groups are further subdivided into cases of "sun-stroke" or "heat stroke", "heat exhaustion", and "heat" not specified (Table VIII). The first question is whether these subdivisions are useful for the purpose in hand. The answer depends upon whether the various clinical types of response to heat are dependent upon the nature of the exposure or upon other factors. Stitt (1929, p. 471) writes of these matters as follows: "In heat exhaustion there are present the factors of high atmospheric temperature, high relative humidity and poor circulation of air in varying relationship as also occurs in connection with the incidence of heat hyperpyrexia. E. E. Smith believes heat hyperpyrexia, heat exhaustion, heat cramps, and sunstroke, all represent various pathologic responses to the same basic etiology. Under identical environmental conditions these various types of reaction have been manifested simultaneously in different patients. The reactions do not represent clear-cut clinical entities and all have much in common. Matters of general physical condition, disease, alcoholism, fatigue, overwork, combine with the environmental conditions to form an etiological basis for the particular clinical picture which is to be present."

We share the views of E. E. Smith and of Stitt as to the factors which may combine to produce

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heat effects, but suggest that to the factors which they mention should, probably, be added certain other favoring factors the significance of which was inferred above; namely, infancy, old age, unsuitable clothing and unfavorable conditions of employment, and that sex mortality is closely related to conditions of employment or occupation. Analysis of the new data to be presented should throw further light on these problems.

Nomenclature. The question of the validity of the term "sunstroke" has been answered by Fiske for the United States Navy and by Walker for cases observed in Boston. Fiske (1913) writes that "insolation" often occurs among men not exposed to the direct rays of the sun and says that Dr. Kitchen told him that on the monitor "Dictator" it was common for men to be brought to him showing coma, stertorous breathing, great heat of the skin, full, quick pulse, and, often, convulsions. Such cases, probably, are not distinguishable clinically from severe forms of sunstroke.

Walker (1911) reported a series of cases of heat effects which were brought for treatment to the Carney Hospital in Boston during the first heat-wave of July, 1911. Four among these had temperatures of 107°F. when admitted. Three of them, he says, had not been taking alcohol and two of these "were in the house all day". Therefore, it appears that "sunstroke" in Boston, and in the United States Navy as well, is a symptom complex which bears no necessary relationship either to exposure to the sun, or to alcoholism, and that sunstroke and heat-stroke present the same clinical picture and may be considered as the same clinical entity.

Consequently, we suggest that the term "heat hyperpyrexia" should supplant both "sunstroke" and "heat stroke". The term "heat hyperpyrexia" has the advantage that it indicates clearly the group of cases characterized by high body temperature and hot dry skin, and it excludes cases of heat exhaustion in which the temperature is normal, subnormal, or but slightly elevated, the skin moist and clammy, and the circulatory disturbances like those of shock.

Grouping of Cases. Inasmuch as we believe that heat hyperpyrexia and heat exhaustion have the same basic etiology and that there are numerous cases in which some of the characteristics of both types of response are manifested, it seems desirable for the purpose in hand to consolidate all cases of primary heat effects.

Similarly, although the death certificates distinguish cases in which heat was considered the primary cause of death from those in which heat appeared to be a factor of secondary importance, it seems expedient in the first analysis to consolidate all heat cases whether primary or secondary. In discussing special groups of cases farther on, however, we have adhered to the nomenclature of the death certificates.

DEATHS IN BOSTON AND IN MASSACHUSETTS

Table I shows in the right hand column the strikingly large total of 1,105 deaths from heat in Massachusetts in the year 1911 whereas the annual average for the State between the years 1900 and 1930 is only 57 deaths.

Other columns show that nearly half of the deaths from heat in 1911 occurred in Boston alone. There must, therefore, be special reasons for the great number of heat deaths in Massachusetts in that year and for the very large proportion of such deaths in Boston.

We shall first attack the problem of the causes of these deaths from heat by a further inquiry into the probable influence of meteorological factors.

HEAT-WAVES IN BOSTON

In Figure I, are graphically recorded meteorological data for Boston and deaths ascribed primarily or secondarily to heat during the periods of five heat-waves during which the mortality from heat was notably increased. The figures for temperatures are averages of the maximum and minimum temperatures for each day; and the humidities taken at 8 A.M. and at 8 P.M. and the wind velocities taken at the same hours have been averaged likewise to give a single figure for each day. The original meteorological data are shown in Table I.

Figure I shows that, during the heat-wave of 1901, the peak of deaths occurred on July second, the fifth day of continuous heat. During the first two of these days the effects of the relatively high humidity may have been neutralized by the relatively high wind velocity. The cause of the fall in the number of deaths on the sixth day is not apparent, for the temperature remained high, the wind velocity was low, the humidity was rising, and it was a working day.

The first heat-wave of 1911 shows its peak of deaths on the fourth day of severe heat and its far greater height may be due to relatively high and increasing humidity and relatively low wind velocity on that day.

The peak of deaths in the succeeding heat-wave coincides with that of the temperature. It occurred on the second day of severe heat in spite of low humidity and moderate wind velocity. The absence of lag in the peak of deaths may be explained by the brevity of the respite following the previous heat-wave.

The heat-wave in 1917 lasted only four days and the deaths rose sharply to their peak on the fourth day. Wind velocity was very low on the second day and moderate thereafter but humidity was rather high for the first three days and fell a little on the fourth.

The heat-wave of 1925 lasted only three days, and high wind velocities and low humidities on these days, doubtless, helped to keep down the mortality.

In summarizing the effects of meteorological

factors in their relation to deaths in Boston during the five heat-waves above described, it appears:

1. That the factor of chief importance was high temperature.

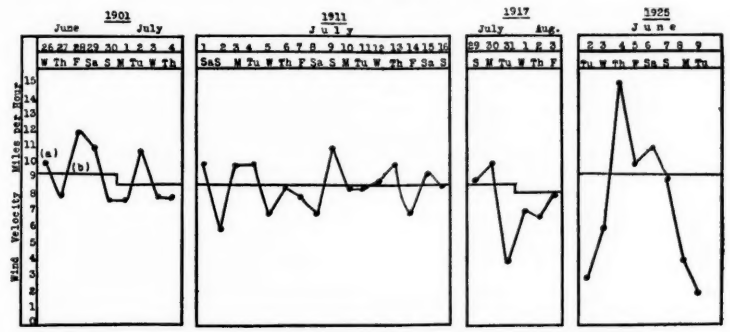
2. That high temperature does not produce a great number of deaths unless continued for three or four days.

3. That comparatively high humidity tends to increase the number of deaths, and vice-versa.

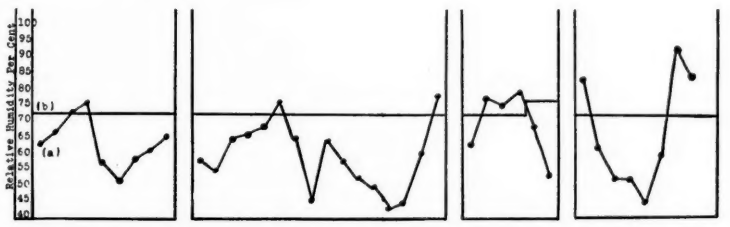
4. That comparatively high wind velocity tends to reduce the number of deaths, and vice-versa.

FIGURE I.

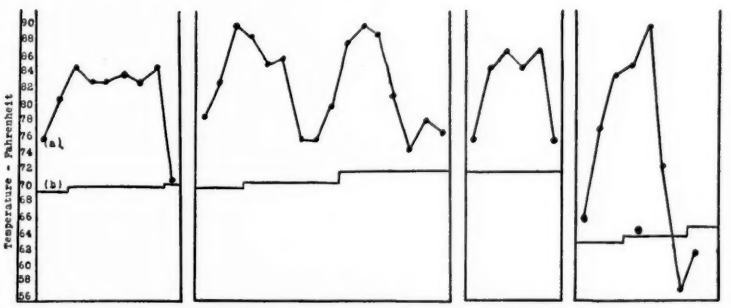
Deaths from Heat in Boston during Heat-Waves Showing Relation to Temperature, Humidity, and Wind Velocity*



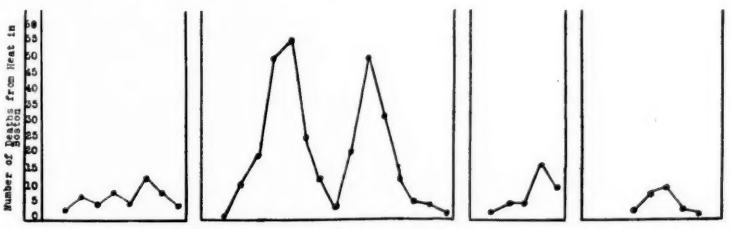
(a) Daily average of morning and evening observations during the heat-waves.
(b) Normal wind velocity (average by months) from 1871 to 1930.



(a) Daily average of morning and evening observations during the heat-waves.
(b) Normal relative humidity (average by months) from 1871 to 1930.



(a) Daily average of morning and evening observations during the heat-waves.
(b) Normal temperature Fahrenheit (average by days) from 1871 to 1930.



Number of Deaths from Heat Each Day during the Heat-Waves.

*Meteorological Data obtained from Boston Station of the United States Weather Bureau.

These inferences regarding the effects of meteorological conditions in Boston are in accord with the view of Stitt and that of E. E. Smith as to the causation of heat effects in general.

RELATION OF DEATHS TO SIZE OF COMMUNITY

The right-hand column of Table II compares the combined (primary and secondary) death-rates from heat for communities of different sizes. It shows that the rates tend to increase markedly with the population. The highest rate is that for Boston which is the largest city, and the lowest rate is for communities of less than 2,500 inhabitants.

TABLE I

DAILY RECORD OF TEMPERATURE, HUMIDITY AND WIND VELOCITY IN BOSTON, AND OF DEATHS DUE PRIMARILY AND SECONDARILY TO HEAT IN BOSTON AND IN THE REST OF MASSACHUSETTS, JULY, 1911

Date	Boston									Deaths from Heat		
	Temperature in Deg. Fahr.			Humidity per Cent.			Wind Velocity Miles per Hour					
	Max.	Min.	Avg.	8 A.M.	8 P.M.	Avg.	8 A.M.	8 P.M.	Avg.	Boston	Rest of State	Total
Sat., July 1	88	66	77	61	55	58	6	14	10	0	1	1
Sun. 2	96	71	83.5	64	49	56.5	8	4	6	1	7	8
Mon. 3	102	78	90	68	64	66	6	14	10	12	28	40
Tues. 4	104	74	89	67	66	66.5	8	12	10	20	85	105
Wed. 5	95	76	85.5	73	63	68	7	7	7	55	98	153
Thurs. 6	101	72	86.5	63	89	76	12	5	8.5	62	144	206
Fri. 7	79	69	74	68	65	66.5	12	4	8	26	54	80
Sat. 8	83	65	74	46	44	45	7	8	7.5	13	10	23
Sun. 9	94	66	80	52	69	60.5	11	12	11.5	5	26	31
Mon. 10	98	78	88	61	54	57.5	10	7	8.5	22	39	61
Tues. 11	100	80	90	58	48	53	7	10	8.5	52	104	156
Wed. 12	96	78	87	49	51	50	6	12	9	34	54	88
Thurs. 13	89	73	81	46	39	42.5	11	10	10.5	14	26	40
Fri. 14	79	71	75	46	47	46.5	6	8	7	7	12	19
Sat. 15	88	69	78.5	57	62	59.5	5	14	9.5	6	9	15
Sun. 16	88	67	77.5	82	72	77	8	9	8.5	3	8	11
July 17 to 31										14	54	68
										346	759	1105

The fact that mortality rates from heat tend to be much higher in large communities is in line with our earlier observation (Shattuck and Hilferty, 1932; Conclusion No. 2) to the effect that, as a rule, urban mortality from heat is higher than rural mortality. It seems likely that local atmospheric conditions peculiar to the larger cities may be responsible in part at least for this difference. Rural workers, it is true, are often exposed to severe heat, as in haying which ordinarily is done just at the hottest periods, but the general temperature in the country is probably 2° to 5° lower than in the city, one is not so much shut in, and conditions are not so "stuffy". Wind movement is known to be greater in the country than in the city, and the official wind velocity taken on a high building in the city must be far greater than the air movement which the urban dweller experiences in the street, at work or at home. Moreover, it is safe to assume that after several days of continued heat, the official temperatures which are taken in Boston on the roof of a high building, or elsewhere in the open, are decidedly lower than the temperatures in many of the streets, offices and workshops, and that sleeping rooms do not cool off adequately at night. In crowded sections, accordingly, people may be seen on hot nights trying to sleep on outside stairs or fire escapes. Thus, atmospheric conditions to which city workers are subjected must often be less favorable than official records indicate and, very probably, less favorable than conditions prevailing in the country. Certainly, it is the general feeling that the country is more comfortable during the hot weather, for we do not hear of country people going to the city to escape heat.

TABLE II

DEATHS* FROM HEAT, AND DEATH RATES, ACCORDING TO SIZE OF COMMUNITY—MASSACHUSETTS, 1911

Population of Community	Total Population of Group	Deaths from Heat	Death Rate per 100,000 Population
Over 150,000 (Boston)	670,585	346	52
100,000 to 150,000	476,414	159	33
50,000 to 100,000	552,650	162	29
25,000 to 50,000	455,753	166	36
10,000 to 25,000	432,679	96	22
5,000 to 10,000	342,831	83	24
2,500 to 5,000	176,156	39	22
Under 2,500	269,348	54	20

*Death due primarily and secondarily to heat, combined.

That mortality is not dependent on the size of the community only, is shown by irregularities in the rates in Table II, and still more

clearly in Table III, where rates far higher than those for Boston are shown for certain much smaller communities of various sizes. These outstandingly high rates might be explained, perhaps, by particularly unfavorable local atmospheric conditions, or by differing conditions of living or of employment in such communities.

The relatively high rates for Salem as compared with Lynn are, in some respects, difficult to explain, however, because Lynn has twice the population of Salem and is a great center of manufacturing industries whereas Salem has comparatively little manufacturing. Observations over a longer period would show whether these rates are constant. The situation of Salem, on the other hand, is relatively unfavorable in that Lynn gets the southwest wind off the water whereas Salem is all but cut off from sea breezes from any direction.

TABLE III

DEATHS* FROM HEAT, DEATH RATES† AND POPULATION‡ OF MASSACHUSETTS COMMUNITIES OF 25,000 OR MORE INHABITANTS—JULY, 1911

Community	Population	Deaths from Heat	Death Rates per 100,000 Population
Boston	670,585	347	52
Worcester	145,986	43	29
Fall River	119,295	14	12
Lowell	106,294	69	65
Cambridge	104,839	33	31
New Bedford	96,652	12	12
Lynn	89,336	38	43
Springfield	88,926	12	13
Lawrence	85,892	57	67
Somerville	77,236	28	36
Holyoke	57,730	12	21
Brockton	56,878	6	—
Malden	44,404	17	38
Haverhill	44,115	16	36
Salem	43,697	33	75
Newton	39,806	14	38
Fitchburg	37,826	6	—
Taunton	34,259	4	—
Everett	33,404	13	39
Quincy	32,642	9	—
Chelsea	32,452	22	68
Pittsfield	32,121	4	—
Waltham	27,834	13	47
Brookline	27,792	11	40
Chicopee	25,401	4	—

*Deaths primarily and secondarily from heat, combined.
†No rates given when number of deaths is less than 10.
‡Population as 1910 Census.

Lowell and Lawrence have mortality experiences which are similar and are more severe than those of Boston. Salem and Chelsea also have higher rates than those of Boston, but the numbers involved are not large enough to indicate that the difference may not be due to chance. Worcester, Cambridge, Lynn, and Somerville form an intermediate group which perhaps includes Malden, Haverhill, Everett, Newton and Brookline, although we cannot consider the rates for these latter as at all established. Notable for their low rates are Fall River, New Bedford, Springfield and Brockton. At least two of these, Springfield and Brockton, had on July 4, 1911 a maximum temperature of 104° the same as that reported at Boston.

RELATION OF DEATHS TO OCCUPATION AND SEX

Three circumstances were pointed out in regard to deaths from heat in Massachusetts in the period 1900 to 1930 which may be interpreted as bearing on the question of occupation. The first was that, after maturity, the death rate from heat increases progressively with age. The second was the slight increase in the proportion of female deaths during the 30 years studied. From these facts it was inferred tentatively (1) that during the period of life when men are actively employed they are apt to be subjected to unfavorable working conditions; (2) that the same is increasingly true of women who are being employed more and more in industry; and (3) that the gradual increase of the death rates between 20 and 70 years of age is caused by progressively diminishing vigor. These hypotheses may now be reviewed in their relation to occupation.

Occupations of Males. The information as to occupation which appears on the death certificates is scanty and difficult of classification. Nevertheless, some sort of grouping is necessary, if figures large enough to be useful for comparison are to be obtained. On the other hand, there is danger of obscuring possibly significant matters by making the groups too inclusive. A plausible classification has been made in Table IV which included both primary and secondary deaths from heat. Any such classification is, at best, unsatisfactory. For example, some male workers in a given industry may be exposed to extreme heat while others in the same industry may work under comfortable conditions. Moreover, many persons whose occupations, as such, do not ordinarily expose them to heat are so exposed in fact during a heat wave. Table IV is based upon 557 decedents of whom 122 had no occupation, but nearly all of these (i.e., 107) were more than 60 years of age.

Of the 435 working males who died, it is noteworthy that 19 per cent were engaged in labor not specified which may have been performed either indoors or out-of-doors; that another 13 per cent had outdoor occupations not specified which presumably involved labor. Approximately, therefore, 32 per cent of decedents were engaged in laborious, unskilled work.

Another 14 per cent, however, were indoor workers not ordinarily exposed to heat and whose work may not have been arduous. Without knowing the total numbers of men various-

ly engaged, death-rates by occupation cannot be calculated, and numerical comparisons have a limited value. That out-of-door labor, as such, is not particularly dangerous is indicated by the low death-rates from heat in rural districts, but arduous labor, nevertheless, appears to be a factor of importance in many cases.

Occupations of females are even less satisfactory for classification than those of males. For example, housework may mean nearly constant exposure to heat in a kitchen, comparatively hard physical labor, light housekeeping, or supervision only. The outstanding figure for housework is correlated probably with the fact that the great majority of women able to work are engaged primarily in housework of some sort. We do not feel that important conclusions with regard to women can be drawn from Table IV.

Sex. The possible influence of sex upon death-rates from heat is obscured by marked differences of occupation and of working environment (Table IV). Rates for primary "sunstroke" for the sexes in Boston and in the rest of the State are shown in Table V by age-groups. The rates in every case are far higher for males than for females and the difference is especially marked during the more active working years, i.e., between the ages of 20 and 59. Thus, again, the more arduous occupations seem to favor heat effects.

TABLE IV

DEATHS FROM HEAT, BY SEX AND OCCUPATION FOR THE AGE-GROUPS 20 TO 59 YEARS AND 60 YEARS AND OVER—MASSACHUSETTS, JULY, 1911

Occupation	Males				Females			
	20-60	60+	Total	435 Occupied Males	20-60	60+	Total	212 Occupied Females
Agriculture	28	6	34					
Building trades	23	22	45					
Other outdoor	48	11	59	13.5%				
Indoor not exposed to heat	33	28	61	13.9%	19	8	27	
Indoor exposed to heat	33	21	52		2	1	3	
Labor not specified	70	14	84	19.2%				
Various	47	25	72	16.7%	1	3	4	
Unknown	20	8	28		16	12	28	
Housework	0	0	0		72	78	150	68.9%
None	15	107	122		13	146	159	
Totals	317	242	557		123	248	371	

TABLE V

DEATH RATES FROM PRIMARY SUNSTROKE IN THE AGE-GROUPS* 20 TO 59 YEARS AND 60 YEARS AND OVER, BY SEX, FOR BOSTON AND FOR THE REST OF MASSACHUSETTS, JULY, 1911

	Boston		*Rest of the State*	
	Male	Female	Male	Female
20-59 years	55±6	9±2	11±1	2±0.5
60+ years	140±28	44±13	33±6	21±4
All Ages	41±3	11±2	9±1	4±0.5

*The deaths under 20 years are too few to justify rates for these subdivisions.

In Table VI. The rates for the Irish-born are far higher than for the other races not only in Boston, but also in other parts of the State.

Moreover, persons of Irish birth constituted only 6.6 per cent of the population of Massachusetts in 1911 but among the 309 working decedents classified by occupations in Table VII, the Irish-born numbered 130 or 42 per cent.

TABLE VI

DEATH-RATES OF IRISH AND OF OTHERS FROM PRIMARY HEAT EFFECTS ONLY—IN BOSTON AND IN THE REST OF MASSACHUSETTS, JULY, 1911

Residence	Death-Rate per 100,000 Persons	
	Born in Ireland	Born Elsewhere
Boston	153	22
Rest of Massachusetts	39	14
Massachusetts	98	19

Of the Irish decedents, 60 per cent were engaged in labor not specified, agriculture, or other outdoor work, and only 37 per cent of the other races were so engaged. Apparently, therefore, a larger proportion of the Irish were then engaged in unskilled labor which we believe favors heat effects because of the physical activity required. Consequently, there appears to be an occupational factor involved in the high proportion of deaths from heat among the Irish.

RELATION OF DEATHS FROM HEAT TO RACE

The possible influence of race presents a problem of peculiar interest but difficult of interpretation.

Comparative death-rates from primary heat effects for those born in Ireland and for all others living in Massachusetts in 1911 are shown

It is possible, also, that the habits of eating and drinking of the Irish may not be well suited to hot weather. They were believed, 20 years ago, to use alcoholic beverages more freely than the races longer established here. Thus, alcoholism may be another factor correlated with race.

It may be pointed out that the Irish race has been accustomed in Ireland for well over 1,000 years to a climate which is far milder and more uniform than that of Massachusetts; that, consequently, they may have developed a greater susceptibility to heat and cold as well, and they are known to be more susceptible to respiratory infections than is the general population of Massachusetts. The English have grown up in a climate not very different from that of Ireland, they seem to suffer greatly in England if the temperature rises to 85° or so, and it is notorious that they are convinced, with few exceptions, that exposure to the sun in any part of the tropics is very dangerous for them. This fear is shared also by French officials in Indo-China and perhaps elsewhere. On the other hand, the French living in different parts of France are exposed to different climatic conditions. The northern and western parts of the country are cooled in summer by prevailing westerly winds off the Atlantic whereas in the southeastern part not reached by this wind, summer temperatures are higher. Consequently, people living in this region may be more resistant to heat than those from the cooler parts of France.

TABLE VII

OCCUPATIONS OF IRISH AND OTHERS, 20 YEARS OF AGE AND OVER, WHOSE DEATHS WERE DUE PRIMARILY TO HEAT—MASSACHUSETTS, JULY, 1911

Occupations	Deaths			
	Irish		All Others	
Laborers	48	60%	21	37%
Agriculture	7		19	
Other out-door	23		27	
Building trades	7		23	
Indoors not exposed to heat	15		48	
Indoors exposed to heat	19		22	
Various	8		15	
Unknown	3		4	
	130		179	

The question of racial susceptibility to the sun in the tropics is obscured by the possible existence of factors as yet unknown operating especially in India, Indo-China and Africa.

With regard to the Irish-born in Massachusetts, it can only be said that a marked racial susceptibility may exist but that it is obscured by correlated factors which probably have some significance.

CLOTHING, HOUSING, AND HABITS

Clothing. No formal data on clothing are available but it is certain that the conventional clothing worn by men in 1911 in cities and particularly by office workers was by no means suited to unusually hot weather. In the country, the coat is more often discarded and the shirt more often left open at the neck, but continued and trying heat in Massachusetts does not last many days at a time and its advent is so irregular and unpredictable that few men wear the light clothing that such conditions demand. Therefore, it is highly probable that unsuitable clothing was a factor in the mortality of males during the heat-waves above described and also that this factor was of greater significance in the cities than in the country. Moreover, the women in 1911 did not dress so lightly as they do now.

Housing. The buildings in which we live and work in Massachusetts are designed for protection from cold rather than from heat. Consequently, they are not often shaded by porticos or verandas and are not adapted to free ventilation such as is provided for in the tropics. It is true that a massive building, if kept closed, will keep out the heat for a few days but, after it has become overheated throughout, it cools with corresponding slowness. Undoubtedly, many deaths during heat-waves in Massachusetts are due, in large measure, to inadequate ventilation and air movement in dwellings, offices and shops.

Habits. In tropical countries where heat is continuous throughout the year or during a large part of every year, arduous work is performed, or strenuous exercise taken, as a rule, only during the comparatively cool periods of the day, i.e., in the early morning or in the late afternoon. Both for natives and for foreign residents alike, life is leisurely and worry is unusual. These are instinctive defence mechanisms of undoubted value, but it is difficult to make these desirable adaptations for the short periods of heat which occur so irregularly in Massachusetts. Therefore, undoubtedly, habits of life and of work play a part in our mortality from heat.

RATES FOR PRIMARY HEAT EFFECTS

The numerical distribution of 1105 deaths from heat divided into primary and secondary groups and subdivided, as in the death certificates, is shown for Massachusetts as a whole in the year 1911 (Table VIII) and for Boston and for groups of the larger and of the smaller communities as well. It can be assumed that many of the irregularities in the figures are due to differing criteria of diagnosis and that others might be ironed out by larger figures.

Deaths primarily from heat are shown to represent 62.5 per cent of the total as compared with 37.4 per cent for cases in which heat was considered a secondary cause.

Rates for primary sunstroke and primary heat exhaustion and combined rates are shown in Table IX. The total primary rates, like those

TABLE VIII

DEATHS DUE PRIMARILY AND SECONDARILY TO HEAT ACCORDING TO TYPE OF EFFECT IN BOSTON, IN THE OTHER LARGE COMMUNITIES, IN THE SMALL COMMUNITIES, AND IN MASSACHUSETTS (TOTAL), JULY, 1911

	Primary Cause of Death: 62.6%				Secondary Cause of Death: 37.3%			
	Sunstroke	Heat Exhaustion	"Heat"	Total	Sunstroke	Heat Exhaustion	"Heat"	Total
Boston	165 (71%)	64 (27%)	5 (2%)	234	13 (12%)	59 (53%)	40 (36%)	112
Other cities with population over 25,000	114 (39%)	155 (53%)	21 (7%)	290	11 (6%)	130 (66%)	56 (28%)	197
Cities and towns with population less than 25,000	58 (34%)	97 (58%)	13 (8%)	168	10 (10%)	61 (59%)	33 (32%)	104
Massachusetts	337 (48.7%)	316 (45.6%)	39 (5.6%)	692	34 (8.2%)	250 (60.5%)	129 (31.2%)	413

TABLE IX

DEATH-RATES FROM PRIMARY SUNSTROKE AND FROM PRIMARY HEAT EXHAUSTION, AND FROM ALL PRIMARY HEAT EFFECTS FOR BOSTON, FOR THE OTHER LARGE COMMUNITIES AND THE SMALL COMMUNITIES IN MASSACHUSETTS, JULY, 1911

	Primary Sunstroke	Primary Heat Exhaustion	Total Primary
Boston	24.6±1.9	10.3±1.2	34.9±2.2
Other cities with population over 25,000	7.7±0.7	11.9±0.9	19.6±1.1
Cities and towns with population under 25,000	4.6±1.8	9.3±0.9	13.9±1.1

for all heat deaths (Table II), show a well-marked correlation with the size of the community but, whereas the rates for "sunstroke" are far higher in Boston than in the other population groups, those for "heat exhaustion" are nearly the same. In Boston, the rate for "sunstroke" is more than double that for "heat exhaustion" whereas the reverse is true in the smaller communities. It is doubtful whether these striking differences in the figures are to be ascribed wholly to differing criteria of diagnosis or whether they represent, in part, real differences of response to heat.

Primary Sunstroke. If we specify the primary sunstroke rate for age and sex (Table V) we find that for the males in each age subdivision, the Boston rates are many times higher than those for the rest of the State, and that the difference is proportionately greater in the age period from 20 to 59 years than in the older age-group. The males have a higher rate in both age-groups than the females and, again, the relative difference between the sexes is greater in the age-groups from 20 to 59 years. Males, then, are far more liable than females to "sunstroke" and the difference is particularly marked in males of working age. This fact suggests that the more arduous occupation of such males may be a factor in this type of response.

On the other hand, after the age of 60 there is a very marked increase in the death-rates from "sunstroke" in both sexes. This is true even though, as we have seen in Table IV, a large proportion of both men and women of this age-group have no occupation. Moreover, it can be assumed safely that persons of over sixty are little exposed to the sun. Here is another reason for the view expressed at the outset that "sunstroke" in Massachusetts is to be regarded as a type of response to heat rather than to the sun as such.

Primary Heat Exhaustion. The rates for "heat exhaustion" as a primary cause of death show no significant difference between Boston and other population groups but these two classifications are maintained in order to allow comparison with the corresponding rates for primary sunstroke (Table IX). With the exception of Boston, heat exhaustion appears to be more common than sunstroke in the larger cities and much more prevalent in the group of smaller cities. It is doubtful whether these differences in the figures are attributable to differing responses to heat or to differing diagnostic criteria.

Table X indicates that between the ages of 20 and 59 years sunstroke is rather more common than heat exhaustion in the combined group of laborers, agricultural workers, and other outdoor workers, i.e., 52 per cent as compared with 44 per cent of cases. After the age of 60, both conditions occur most frequently among the retired, who it may be assumed are little exposed to the sun. The other prominent figure for "sunstroke" represents indoor workers "exposed to

heat'' and that for heat exhaustion represents indoor workers ''not exposed to heat''. These figures are in accord with the views already expressed that arduous forms of labor and lowered vitality favor the development of heat effects, and that direct exposure to the sun or the lack of it does not determine the type of response.

Table X indicates again that the Irish-born are particularly subject to heat effects. Between the ages of 20 and 59 they suffer particularly from ''sun-stroke'', but, in later years, cases of heat exhaustion and of sunstroke are about equally common among them.

TABLE X

OCCUPATION OF IRISH AND OTHER MALES 20 TO 59 YEARS AND 60 YEARS AND OVER, WHOSE DEATHS WERE DUE PRIMARILY TO SUNSTROKE AND OF THOSE WHOSE DEATHS WERE DUE PRIMARILY TO HEAT EXHAUSTION IN MASSACHUSETTS, JULY, 1911

Occupation	Sunstroke				Heat Exhaustion			
	Irish	Other	Unknown	Total	Irish	Other	Unknown	Total
Males 20-59 Years								
Retired	1	4		5	1	3		4
Agriculture	4	11	3	18*	1	6		7†
Building trades	3	7		10	2	5		7
Other outdoor	20	9		29*	1	13		14†
Indoors, not exposed to heat	6	19		25	5	10		15
Indoors, exposed to heat	10	11		21	2	2		4
Laborers	33	14	2	49*	6	4		10†
Various	2	8		10	3	5		8
Unknown	2	1	14	17	0	1		1
Total	81	84	19	184	21	49		70
*52%							†44%	
Males 60+ Years								
Retired	5	14		19	12	35		47
Agriculture	1	0		1	1	2		3
Building trades	2	5		7	0	6		6
Other outdoor	1	4		5	1	1		2
Indoors, not exposed to heat	3	4		7	1	15		16
Indoors, exposed to heat	5	8		13	2	1		3
Laborers	4	3		7	5	0		5
Various	1	0		1	2	2		4
Unknown	0	0		0	1	2		3
Total	22	38		60	25	64		89

SECONDARY HEAT EFFECTS

Most of the deaths attributed to heat secondarily are classified in the certificates from Boston and from the other cities of Massachusetts as due to heat exhaustion rather than to sunstroke (Table VIII), and the group of ''heat'' cases not specified accounts for about a third of the secondary deaths, whereas the unspecified group represents a relatively small proportion of the primary heat deaths.

Death-rates from primary and secondary heat effects are contrasted in Table XI for populations of various sizes. Both groups of effects show a correlation with size of the community, but this trend is less pronounced for secondary effects.

Age. The relation of secondary heat effects to age is shown in Table XI. The rate becomes very high after 60 years of age. The size of the figure for those under 20 years of age is accounted for by the inclusion of infants who, as has been shown, are rather susceptible to heat effects.

There are no significant differences between the sexes in regard to mortality from heat as a secondary cause, nor between Boston and the rest of the State except for females over 60 years of age, whose rate is twice as high in Boston as in the rest of the State.

CONTRIBUTORY CAUSES OF DEATH

Among deaths associated with heat, contributory causes of death may be either primary or secondary. Inasmuch as such a classification must be largely arbitrary, however, it seems best

TABLE XI

DEATH-RATES PER 100,000 POPULATION FROM HEAT AS A SECONDARY CAUSE OF DEATH, BY AGE AND SEX FOR BOSTON AND THE REST OF MASSACHUSETTS, JULY, 1911

	Under 20 Yrs.	20-59 Yrs.	60+ Yrs.
Boston			
Males	10±3	10±2	95±22
Females	13±4	6±2	143±24
Rest of State			
Males	6±1	6±1	73±8
Females	8±1	4±1	68±7

to consider the frequency of contributory causes without regard to this distinction.

Table XII shows that of the contributory diseases, those of the circulatory system gave the highest percentage of frequency in Massachusetts in 1911. The same was true for the United States Registration Area in the years 1917 and 1925.

Diseases of the digestive system also show large percentages except in persons over 20 years of age in Massachusetts. This fact suggests that most of such deaths occurred in infancy. "Respiratory diseases" plus pneumonia, on the other hand, show markedly increased prominence among those over 20 years of age in Massachusetts, but they are not prominent in the Registration Area. Cerebral hemorrhage is consistently prominent in all the columns but far less so than the diseases already mentioned. Alcoholism shows smaller figures than might have been expected. Genito-urinary diseases are consistently important. The other figures do not seem to be particularly significant.

TABLE XII

RELATIVE FREQUENCY OF DISEASES ASSOCIATED WITH HEAT AS CAUSES OF DEATH IN MASSACHUSETTS IN JULY, 1911, COMPARED WITH SIMILAR FIGURES FOR THE UNITED STATES REGISTRATION AREA, 1917 AND 1925, AND WITH THE PROPORTIONS OF THESE DISEASES AMONG THE TOTAL DEATHS IN MASSACHUSETTS IN JULY, 1911, AND ALSO AMONG THE DEATHS OF PERSONS 20 YEARS AND OVER DURING THE WHOLE OF THE YEAR 1911

	Percentage of All Causes Associated with Heat			Percentage of Deaths in Mass.	
	Mass. July, 1911	U. S. Reg. Area 1917	U. S. Reg. Area 1925	All Ages July, 1911	20 Yrs. and Over Total for 1911
Diseases of the Circulatory System	29%	24%	37%	12%	20%
Diseases of the Respiratory System	10	6	7	15	24
Tuberculosis	2			9	11
Pneumonia	5			4	8
Cerebral Hemorrhage	10	8	8	8	11
Alcoholism	4	6	3	0.7	0.6
Tumors	2	1		5	9
Diseases of the Digestive System	13	19	11	19	6
Insanity	4	1	1	0.4	0.6
Epilepsy	1			0.3	0.3
Diseases of the Genito-Urinary System	5	8	7	7	10
Senility	10	7	7	1	1.6

Contributory causes of death are reported on the Massachusetts death certificates much more frequently in connection with heat exhaustion than with "sunstroke", i.e., in 62 per cent of cases of primary heat exhaustion and in only 23 per cent of primary sunstroke. This fact indicates that the exhaustion type of response tends to be more prevalent than hyperpyrexia in persons already debilitated by disease.

Table X shows that hyperpyrexia is more than twice as common as exhaustion in Massachusetts in persons between 20 and 59 years of age and that, after 60 years of age, cases of exhaustion predominate. This fact suggests again that the debility of the elderly favors the exhaustion type of response.

SUMMARY AND CONCLUSIONS

The data presented point to certain factors which appear to influence deaths associated with heat in Massachusetts. In the first analysis, cases diagnosed as "sunstroke", "heat exhaustion", or "heat" unspecified, whether "primary" or "secondary" have been consolidated as heat effects.

Some of the conclusions reached in a previous paper (Shattuck and Hilferty: 1932) have been recapitulated above. The following additional inferences and conclusions have been drawn:

1. "Sunstroke" and "heat stroke" are types of response to heat which are indistinguishable clinically. The symptom-complex to which they refer not infrequently develops without exposure to the sun. Because the first of these terms is misleading and the second is vague, they should both be replaced by the term heat hyperpyrexia.
2. Heat exhaustion refers to a different clinical type of response for which it is sufficiently descriptive.
3. There are many cases of heat effects in which the response is of an intermediate character. Such cases do not fall naturally into either group.
4. The type of response is governed far less by the nature of the exposure than by other factors. It is logical, therefore, when considering the causes which tend to produce heat effects, to consolidate all types of response. It is necessary to separate them only for the purpose of determining the influences which favor a particular type of response.
5. Deaths from heat in Massachusetts have

been strikingly numerous during certain heat-waves in which high temperature persisting for several days at a time seems to have been the outstanding cause. Relatively high humidity or low wind velocity seems to have contributed to the mortality on some of the days.

6. Other factors favoring abnormal heat effects in Massachusetts appear to be

(a) arduous labor,
(b) excessive heat and deficient air movement in places of employment and in domiciles, particularly in the larger cities,
(c) unsuitable clothing,
(d) low vitality in infancy,
(e) diminished vitality after the age of sixty,
(f) perhaps, racial susceptibility of the Irish-born,
(g) perhaps, unsuitable habits of eating and drinking,
(h) associated debilitating diseases.

7. The type of response shows a definite correlation with age. Hyperpyrexia is far more common than exhaustion between the ages of 20 and 59 but exhaustion predominates after 60 years of age. Therefore, exhaustion appears to be associated with diminished vitality or decreased physiological adaptability.

8. Among deaths due primarily to heat, hyperpyrexia predominates strikingly in Boston but, in the other communities of Massachusetts, the rates for exhaustion are higher than those for hyperpyrexia. In towns of under 25,000 inhabitants, the rate from exhaustion is double that from hyperpyrexia. The meaning of this fact is not entirely clear. Figures on the age distribution of heat effects in these towns might show that it is chiefly the elderly who die from heat effects in the smaller towns and, thus, the findings would fall into line with conclusion number 7, above.

9. Among deaths attributed to heat as a secondary factor, exhaustion is far more common than hyperpyrexia. This fact points again to lowered vitality as favoring the exhaustion type of response.

10. As contributory causes of deaths from heat, not only in Massachusetts but also in the United States Registration Area, diseases of the circulatory system stand first by a large average. This fact suggests (a) that the circulatory system suffers particularly from the effects of excessive heat and (b) that the correlation of heat deaths with increasing age is due to progressive diminution of adaptability of the circulatory system to stress of this kind.

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THE DIAGNOSIS AND TREATMENT OF PERNICIOUS ANEMIA*

BY WILLIAM P. MURPHY, M.D.†

INTEREST in behalf of earlier diagnosis and treatment of pernicious anemia has been aroused since the introduction of an adequate means of treating it[1]. Although little has been added to our knowledge of the clinical picture since Addison[2] gave us the first comprehensive description of the disease in 1849, a brief résumé of the cardinal symptoms may well preface a discussion of the treatment.

The sore tongue so characteristic of the disease is often an early and predominant symptom. This soreness may involve the sides or surface of the tongue and may be accompanied by atrophy of the papillae. It often persists for weeks or months and is not to be confused with simple canker. At times this irritation may involve the buccal mucous surfaces or the throat, or it may be present as irritation under a plate of false teeth. Rarely does improvement occur except with remission of the disease. Since irritation or soreness of the tongue occurs rarely in this part of the country from other causes, such a condition which is persistent should lead one to strongly suspect pernicious anemia.

Those symptoms generally considered to be the result of sclerosis or irritation of peripheral or spinal nerves stand out prominently as an aid to diagnosis in many patients. Persistent numbness and tingling of the feet or hands, a sensation of coldness of the extremities perhaps accompanied by a sense of tightness of the skin, loss of deep tactile sense, and finally alteration in locomotion are all of outstanding importance and may occur early in the course of the disease even in the absence of anemia of note.

A persistent general feeling of ill-health, nervousness and gastro-intestinal disturbances may occur with or without the above characteristic

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Paper read before the Norfolk District Medical Society (Massachusetts) on February 28, 1933.
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symptoms and should lead to complete studies of the blood.

A feature of the disease which is of interest and often helpful from a diagnostic point of view is the relative freedom from marked weakness or disability even with a severe degree of anemia. The patient is not infrequently still actively at work and not strikingly ill even with a reduction of the red blood cell count to a level of 1,000,000 or less cells per cubic millimeter.

The blood picture is characterized by a high color index, macrocytosis (increased cell volume and diameter), increased icteric index and a leukopenia with multi-lobulated polymorphonuclear leukocytes.

The presence of free hydrochloric acid in the gastric secretion is to be considered as a strong argument against the diagnosis of pernicious anemia.

TREATMENT

Owing to the fact that three systems of the body (blood, gastro-intestinal and nervous) may be altered in an individual with pernicious anemia, treatment must be carried out so that the maximum benefit may be obtained in respect to each of these systems. The key to satisfactory treatment is the condition of the blood. Only with the maintenance of a normal red blood cell level (5,000,000 or more per cubic millimeter) will an optimal state of health be insured. With the blood in a normal condition one may reasonably expect the mouth symptoms to disappear, there should be improvement in the nerve disturbances if present, and an onset of such symptoms should not occur.

It is thus important that the blood, if in a state of relapse, be brought to a normal level in the shortest possible period of time and that it then be maintained so. This may be accomplished by the use of large amounts of liver or substitutes for it, to be ingested, or, as has now been adequately demonstrated, by the intramuscular injection of a concentrated solution of liver extract.

For the patient in relapse, liver, either broiled or as the raw pulp, should be administered in amounts of one-half pound (240 to 300 Gm.) or more daily until the red blood cell count has reached the 5,000,000 level, and thereafter in quantities sufficient to maintain this level. It will be necessary to check the red blood cell count frequently, the interval between counts being determined by the state of the blood. Experience has shown that the average maintenance dose will be about five ounces (150 Gm.) of liver daily although larger amounts are often necessary, particularly if nerve disturbances are present.

In substituting peroral liver extract for liver it should be recognized that not more than 50 to 60 per cent of the effective substance contained in liver is retained in the extract (fraction G of Cohn)[3]. Therefore adequate dosage for the patient whose blood is in relapse will be the extract prepared from 500 to 600 Gm. of liver administered daily. For maintenance purposes the extract from 300 Gm. may be considered the average daily intake.

Although it is possible to produce and maintain a satisfactory remission of the anemia with the ingestion of adequate amounts of liver or potent substitutes for it, the use of a concentrated liver extract administered intramuscularly offers even greater assurance of adequate treatment.

The first published account of the intramuscular use of liver extract in this country, a report of the discussion before the Harvard Medical Society of a patient so treated at the Peter Bent Brigham Hospital[4], has been followed by reports from several clinics showing the striking effect of such treatment.

For the critically ill patient there are several outstanding advantages in the intramuscular use of liver extract. Because of the manner of administration one does not need to depend upon ingestion of material which may be impossible for the nauseated or comatose patient. The necessity for resort to transfusion with the chance of serious reaction is also obviated.

The unusual rapidity of the response is an outstanding advantage of the intramuscular method for all patients. Evidence of beginning blood formation may be observed as an increase in the reticulocytes as early as 36 to 48 hours after the initial injection and the peak of the rise will occur usually on the fourth or fifth day, from two to five days earlier than is to be expected following peroral treatment.

As might be expected in consideration of the early response and a higher reticulocyte peak than is generally observed following peroral therapy, adult red blood cell formation takes place at a very rapid rate. One may expect an average daily increase of cells at a rate almost twice that observed with liver or liver extract administered by mouth. The rapid improvement possible is of particular importance to the patient with evidences of cord sclerosis in whom it is necessary to get the red blood cell count to a normal level in order to check the process and to start the patient on the road to improvement in respect to the nerve symptoms.

The method previously described[5] for bringing about optimal improvement is to administer a maximal initial dose to be followed by less frequent injections. One or more preliminary small test doses (0.2 and 0.4 cc.) of the solution of liver extract* are given subcutaneously to rule out possible unusual sensitivity to the material. If no chill or fever occurs within one hour 6 cc. of extract obtained from 200 Gm. of liver is injected into the gluteal muscles, and

*The extract used is Solution Liver Extract Lederle. The method of treatment described refers to the use of this extract only.

at some interval within twelve hours another similar dose is given. Thereafter it is advisable to give an injection of 3 cc. of extract obtained from 100 Gm. of liver at weekly intervals until the red blood cell count is well over 5,000,000. As with peroral treatment the dose necessary to maintain the blood above this level will be found by trial, in this instance, by observing the effect of increasing intervals between the injections of 3 cc. of extract on the red blood cell count. Experience over a period of nearly two years and in over 100 patients indicates that the interval between injections of 3 cc. may vary from one to six weeks[6]. The average interval for the entire group is three to four weeks. More frequent and smaller doses may be used if desired, but experience in this large group of patients has given no indication that such treatment is more beneficial and, except in rare instances, it is distinctly less convenient and less desirable for the patient.

Therapy other than the use of liver or an effective substitute for it is of secondary importance. It may be advantageous to give iron at some time during the course of treatment to some patients. This is rarely necessary if whole liver is used, perhaps because of the iron contained therein, but is often beneficial in those receiving the extract either by mouth or intramuscularly. This may be administered best, and with the minimum of expense to the patient, as ferric ammonium citrate, 3 Gm. daily, or as ferrous carbonate (Blaud's pills) 3 to 5 Gm. daily. Diluted hydrochloric acid may prove to be of benefit in those patients with persistent gastro-intestinal disturbances and should be given in doses up to three to six teaspoonfuls daily well diluted, at mealtime. The diet as previously described for use in the patient with pernicious anemia[1,7] is generally to be recommended as that best suited to the needs of the average patient, but it may be altered to fit the needs of the individual who may have complicating arthritis, nephritis, obesity, etc.[8] Arsenic is usually not indicated but the ordinary medications necessary for relief of various symptoms may be used. For the patient with disturbances in locomotion, exercises designed to improve the balance and to retrain the muscles are often of the greatest value. These are most effective after the blood has become normal although they may be instituted shortly before this and should be carried out under the advice of one familiar with this problem through experience with such methods in arthritis and poliomyelitis. Unskilled massage, manipulation and vibration methods are often distinctly harmful and rarely beneficial.

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THE DIAGNOSIS AND TREATMENT OF SECONDARY ANEMIA*

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UNDER the heading of "secondary" may be included primarily those anemias more recently classified as hypochromic in type. A discussion of the diagnosis of this very large and commonly occurring group of anemias must take into account the various etiological factors which enter into their production. Inasmuch as the time available is limited a detailed analysis of this subject will not be undertaken. However, for the purposes of discussion of treatment the following brief classification may be made:

1. Anemia resulting from hemorrhage—both acute and chronic.

2. Idiopathic hypochromic or chronic chlorotic anemia. The primary cause of this type of anemia is unknown, as the name indicates, although the changes commonly observed in the blood suggest a disturbed function of the bone marrow. The fact that achlorhydria or a low acidity of the gastric contents is often associated with this disease suggests the possibility of a relation between the bone marrow dysfunction and a deficiency of some sort in the gastric secretion. That this deficiency is something other than the lack of hydrochloric acid is suggested by the fact that an anemia which is indistinguishable from this type does occur in patients with an essentially normal secretion of hydrochloric acid. This occurs particularly in younger persons than have generally been included in the reported cases, perhaps because the anemia is less severe and accompanied by

*From the Medical Clinic of the Peter Bent Brigham Hospital, Boston.
Paper read before the Norfolk District Medical Society (Massachusetts) on February 28, 1933.
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less striking symptoms and so not recognized. Anemia of the idiopathic hypochromic type is most often observed in women, rarely in men, is generally described as occurring after the age of thirty but often occurring at a younger age, although generally in milder form, and is often associated with chronic hemorrhage such as excessive catamenial flow, with abnormalities of the diet or ability to ingest food, and with a low basal metabolic rate. Weakness may be marked, a tan-colored pallor rather than the lemon-yellow pallor observed in pernicious anemia is often noted in those with the more severe degrees of anemia, the skin and finger nails may appear to be dry and the nails break easily, the tongue may be pale and often irritation by food or other substances may be a complaint. Although marked glossitis has been described as a feature of the disease the author has not encountered, even in severe cases, a true severe irritation or atrophy of the papillae such as may be observed in pernicious anemia. The heart may be enlarged and there is often heard a loud harsh systolic murmur over the precordium. The spleen may be moderately enlarged.

The anemia may be severe with a striking decrease in the hemoglobin level. As little as 3 Gm. of hemoglobin per 100 cc. of blood has been observed in some of our more severe cases. There is a low color index, small cell volume, usually a low icteric index and striking changes in the size and shape of the red blood cells may be seen in the stained blood smear of those with marked anemia.

3. Nutritional anemia.

4. Anemia occurring during pregnancy or in a more severe form, usually following delivery, the so-called hypochromic and macrocytic anemias of pregnancy.

5. Anemia occurring secondary to or with a definite disease condition such as infection, myxedema, nephritis, tuberculosis, leukemia, etc.

Except for weakness or ease of fatigue no characteristic symptoms occur in the anemias other than in the idiopathic hypochromic type except as produced by the pathologic state to which the anemia is secondary. The diagnosis must be made, therefore, from an examination of the blood. The anemia is to be recognized by the low color index, small or normal cell volume, low or normal icteric index, achromia of the red blood cells and in some instances variation in their shape.

TREATMENT

Mengini, in 1746, called attention to the presence of iron in the blood and Blaud, about 1832, demonstrated its value in the treatment of anemia through his use of large doses in patients with chlorosis.

There has been a renewal of interest, during the past decade, in regard to the most efficient means of treating the patient with secondary anemia. As a result of a more intensive study of this problem the various anemias are being recognized more frequently and treated more adequately than ever before.

The subject of the treatment of secondary anemia is a broad one owing to the varied etiology, as previously mentioned. It will be necessary, therefore, to outline only the more important therapeutic measures employed and briefly the result which may be anticipated.

Transfusion: As an emergency measure in the treatment of severe hemorrhage in an otherwise normal person, or less severe hemorrhage in one already anemic, transfusion may be a life-saving measure. It must also be considered of definite value preceding a surgical operation in a severely anemic patient or if thrombocytopenic purpura is present. Transfusion may temporarily relieve the symptoms resulting from anemia in such conditions as nephritis, leukemia, etc., but is of relatively little value in those anemias which readily respond to other forms of therapy.

Iron: The value of large doses of certain of the simple iron salts in the treatment of most of the anemias of the secondary type which respond to therapy has been adequately demonstrated. Ferrous carbonate or ferric ammonium citrate are both readily utilized for hemoglobin formation whereas ferric citrate seems to be somewhat less effective. Ferrous carbonate, administered as Blaud's pill, contains only about one-half the quantity of iron available in an equal weight of ferric ammonium citrate so that the dose administered should theoretically be about twice that of ferric ammonium citrate. A dose of 3 Gm. (45 grains) of the latter is adequate for treatment in most instances. Larger doses may be given if needed. The ferric ammonium citrate may be prescribed in solution, in the form of the crystalline salt, or, more satisfactorily for many patients, as the capsules of the finely powdered salt.* It has not been adequately demonstrated that the more complicated preparations containing the iron salts are more effective in forming hemoglobin in the anemias of adults than are the simple iron salts, and they are uniformly more expensive and often distinctly disagreeable to take.

The effect on the blood of adequate treatment with the simple iron salts is striking in those patients with anemia from chronic loss of blood, those with idiopathic hypochromic anemia or the simple hypochromic anemia of pregnancy. The hemoglobin may increase at the rate of 100 milligrams or more per day[1] during the first few weeks of treatment, and the red blood cells, if decreased, increase proportionately. Diet-

*Prepared by Lederle Laboratories, Inc., 0.5 Gm. or 7½ grains each.

ary regulation is often important especially in those persons whose diet has been inadequate or poorly balanced. It may also be necessary to control the source of bleeding by surgical means if hemorrhage plays an important rôle in the etiology of the anemia and infections should be eradicated where possible, in order to obtain the best results. The blood of those persons made anemic by acute hemorrhage will improve spontaneously if the patient is otherwise in good physical condition so that therapy other than an adequate dietary intake is rarely necessary.

Liver and Intramuscular Injections of Liver Extract: Liver, if given in large doses such as are used in the treatment of pernicious anemia, will also be effective in secondary anemia. If iron, in the dose mentioned, is also given, the effect of the two will be greater than that of either alone, and the effect of the liver appears to be greater than might be expected from the addition of the iron therein. In spite of the fact that liver extract (fraction G of Cohn), when taken by mouth, is not of value in this type of anemia, it has been possible to nearly double the rate of hemoglobin formation over that observed with the use of iron alone by the administration of a solution of liver extract intramuscularly together with the usual dose of iron by mouth[1]. In these patients it is desirable to give an initial intragluteal injection of 6 cc. of the solution* followed by an injection of 3 cc. at weekly intervals until the hemoglobin has reached a normal level.

Improvement both in the blood and in the general condition has been unusually striking in the group of patients treated in this manner. The rapid increase in the hemoglobin may be the result of more efficient utilization of the iron because of the effect of the liver substance in producing red blood cells.

Liver or a solution of liver extract given intramuscularly with iron by mouth is to be considered the treatment of choice in the acutely occurring macrocytic anemias of pregnancy, sometimes called pernicious anemia of pregnancy. Improvement occurs in these patients essentially as it does in true pernicious anemia.

Diet: Inadequate or poorly balanced diets play an important part in the etiology of anemia in many patients. That the diet may alone or in combination with other factors, as in idiopathic hypochromic anemia, produce an anemia suggests the importance of regulating this for all persons with anemia. It should be so advised that the patient will take generous amounts of fruit, vegetables and red muscle meat, with liver if desired. Milk and eggs will be desirable in amounts depending upon the patient's general condition of health and carbohydrate, and fats will be added as needed to supply the proper caloric intake. It is often wise to omit the fried and greasy foods as well as the concentrated carbohydrates such as rich desserts, hot breads, puddings, etc.

Copper: The evidence available does not indicate the necessity of giving copper in order to obtain satisfactory results in the treatment of the anemias of adults. If copper is needed for the proper utilization of iron it is no doubt provided in adequate amounts in the properly balanced diet and as a contaminant of the iron salts.

Hydrochloric Acid: The hydrochloric acid of the stomach is frequently diminished or absent in the patients with idiopathic hypochromemia or the anemias of pregnancy. It may be desirable, therefore, in some instances to give diluted hydrochloric acid in teaspoonful doses, well diluted, with meals. Disturbances in the digestive tract associated with gas formation and diarrhea may be distinctly benefited thereby.

Arsenic: Except as an accessory treatment for leukemia or for its general tonic effect arsenic need not be employed.

*This dosage refers only to Solution Liver Extract—Lederle for parenteral use.

SUMMARY

Notable improvement in the blood of the great majority of anemia patients may be expected, therefore, following the administration of adequate doses of the iron salts, ferrous carbonate (Blaud's pill) or ferric ammonium citrate. With the addition of intramuscular injections of a concentrated solution of liver extract the rate of improvement of the blood is distinctly accelerated. A more detailed report concerning the rate of improvement which may be expected following the various forms of therapy has been made in a previous communication[1] and need not be repeated here.

Anemia due to chronic loss of blood, idiopathic hypochromic anemia, nutritional anemia, and the hypochromic anemia of pregnancy will all show pleasing responses to the simple regimen described. The proper regulation of the diet may be of importance in many persons with anemia and is probably desirable in all anemic patients.

For the satisfactory treatment of the macrocytic (pernicious) anemia of pregnancy, iron alone is generally not adequate. Specific therapy is usually not important for the patient with anemia from acute hemorrhage and improvement is rarely to be expected in the anemia accompanying a specific pathologic condition such as nephritis, myxedema, tuberculosis, etc., except as improvement in the disease is brought about by other forms of treatment.

REFERENCE

1 Murphy, William P.: The treatment of secondary anemia, with special reference to the use of liver extract intramuscularly. Arch. Int. Med. 51: 656 (May) 1933.

PELVIC INFECTION IN WOMEN*

BY LOUIS E. PHANEUF, M.D.†

INFECTIONS of the female genital tract, by their frequency, play an important rôle in pelvic pathology. They may be divided into three large general groups according to the causative agent, namely—gonorrheal, postpartal and postabortal, which are usually due to the streptococcus, and tuberculous. Other infecting organisms play a less conspicuous rôle in this condition responsible for so much invalidism.

Each of the three large groups has a different mode of extension. Gonorrhea spreads along the genital mucous membrane from the vulva to the peritoneum and is an ascending infection in character. Postpartal and postabortal infection extends by way of the lymphatics in the parametria forming brawny induration and broad ligament abscesses; it may reach the uterosacral ligaments leading to posterior parametritis; it may follow the uterus and the uterine tubes to the peritoneum, setting up a septic peritonitis, and finally the infecting organism may enter the blood stream through the lymphatic and venous systems, resulting in septicemia. Pelvic tuberculosis, as a rule, spreads by contiguity from the peritoneum, first involving the Fallopian tubes and then the endometrium. The infection, therefore, is usually a descending one. Rarely the vulva and cervix may be involved as a result of direct contact with a tuberculous male.

GONORRHEAL INFECTION

In studying gonorrhea in the female it is well to bear in mind that there is a continuous passage from the outside world to the peritoneal cavity, a condition which does not exist in the male. This passage extends from the vulva through the vagina, the cervix, the uterus and the uterine tubes. Such an anatomical configuration has a direct bearing on the extension of the disease. The gonococcus, discovered by Neisser in 1897, has a predilection for the mucous membrane of the genital tract, especially that which is lined by cylindrical epithelium, where the organisms may remain alive for months, causing frequent recrudescence of the process. Upward extension to the pelvic structures is favored by (1) menstruation, (2) the puerperal state and (3) instrumentation, especially by the speculum in the hands of the not too careful physician. Gonorrheal infection has a tendency to remain limited to the pelvic and contiguous organs, and rarely do we see it in the form of a general peritonitis.

*Read before the Hartford Medical Society, February 6, 1933.

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CLINICAL COURSE OF GONORRHEA

About seven days after exposure the symptoms are ushered in by painful micturition, burning and swelling in the region of the vulva and edema of the vulvar structures. There appears, at this time, a greenish purulent discharge which is extremely irritating. The ducts of the vulvovaginal glands become involved as does the urethra, a complicating cystitis being a common lesion. If the labia are separated and the vaginal introitus inspected, there will be found two red areas marking the orifices of the ducts of Bartholin. By expression a drop of pus may appear in each one, and by milking the outer third of the urethra a few drops of pus may also be expressed from this area. Smears taken at this time are always positive. In the nulliparous woman the hymen is the normal limiting barrier against ascending infection and if proper care is taken it may be possible to prevent the disease from going beyond this membrane. The next avenue of extension is the vagina. Except during childhood and pregnancy the squamous stratified epithelium of the vaginal tube is resistant to the gonococcus and the reaction in this region is never so severe as in other parts of the genital tract. The cervix is next invaded. The tortuous glands of this organ, lined as they are with cylindrical epithelium, allow the cocci to bury themselves and multiply rapidly. The organisms may remain dormant for a long period of time in the cervical glands. Acute endocervicitis is manifested by a purulent discharge which bathes the vagina. The next natural barrier against infection is the internal os of the uterus, although the cervical plug of mucus also helps in limiting the invasion. Unfortunately the disease does not always remain so localized and may extend upward into the uterus, especially during menstruation, producing a gonorrheal endometritis, soon followed by salpingitis. The reaction on the endosalpinx is severe, and by leakage of purulent exudate through the fimbriated extremity of the tube, the surface of the ovary may take part in the process—perioöphoritis. An infected Graafian follicle may rupture and the ovarian stroma become secondarily involved. Moreover, a gonorrheal pelvic peritonitis may develop from the leakage of infectious material through the tubes. As the inflammatory reaction progresses, the fimbriated extremities agglutinate, the opening is closed, the tube becomes club-shaped and markedly distended with pus and the ovary becomes adherent at the curved area of the tube. By their weight these heavy structures cause the fundus of the uterus to fall with them, with the formation of an ad-

herent retroversion or retroflexion. A pelvic abscess may develop at this stage and the purulent collection may spread to the pelvic peritoneum. The disease seldom goes beyond the pelvis, but remains localized in the uterus, its adnexa and the immediately adjacent organs. The gonococcus may live indefinitely in the deep glandular epithelium yet it becomes inert after six hours' exposure to the air.

With involvement of the pelvic structures the symptoms may be mild, the patient may have a slight rise of temperature, may complain of a dull ache in the tubo-ovarian regions, but may remain ambulatory. On the other hand, the invasion may be manifested by a severe pelvic peritonitis, which may place the patient in bed from the start. There will then be hyperpyrexia, although the fever is never so high as in peritonitis due to other pyogenic organisms, a rise in the pulse rate and a chill or a chilly sensation. The muscles across the pelvis are board-like, the pain is intense and the patient is prostrated and extremely ill. In the course of time the acute symptoms subside and the disease becomes chronic, the pus in the tubes is absorbed or may be replaced by a straw-colored fluid—hydrosalpinx—and adhesions frequently form, keeping the uterus in adherent retroposition. The symptoms are less severe in the chronic stage but are always accentuated by exercise and menstruation. Leucorrhea persists but at this time the organisms are difficult to find; they should be looked for in the urethra, Skene's glands and the ducts of the glands of Bartholin. When the pelvic inflammatory disease has subsided the symptoms continue in the cervix in the form of an endocervicitis, accompanied by a cervical discharge. There is always the possibility of reinfection through the organisms retained in the crypts of the cervix, the urethra and the vulvovaginal glands. Thus we find that the disease gonorrhea, in the female, may be divided into three stages—the first stage, or stage of infection, having the characteristics of an inflammatory reaction of the urethra and cervix, the second stage being the stage of pelvic extension, manifested by excessive flowing or pelvic peritonitis and the third stage or stage of degenerative processes, resulting in chronic invalidism.

Treatment

At the Boston Dispensary, where there exists a large clinic for gonorrhea, two days and two evenings a week are set aside in the Gynecological Department for the treatment of this disease, and a certain definite routine is uniformly followed. The treatment for adults during the stage of infection consists of, 1—a hot sitz bath once daily, at bedtime; 2—a douche with a weak chlorine solution, at bedtime; 3—the insertion in the vagina of a methylene blue suppository (½ grain to each suppository), or of a mercurochrome suppository (4 per cent), after the sitz bath and douche; 4—catharsis and the ingestion of large quantities of water; 5—insistence upon soap and water cleanliness. In the few cases which are intractable to the above treatment, 1—a mercurochrome tablet is placed in the cervical canal or held against the external os by a tampon which is removed the following night. No douches or suppositories are used that night but the patient resumes her treatment the following evening; 2—a cotton pledget, saturated with 20 per cent mercurochrome is left in the urethra. In all cases the importance of reinfection is emphasized and the patient is enjoined to rest as much as possible during the menstrual period. Smears are taken from the urethra and cervix at each visit. During the stage of pelvic involvement, which is manifested by excessive flowing and sometimes by pelvic peritonitis, the patient is kept in bed. For flowing, rest in bed is usually sufficient and, as the condition improves, the periods become more regular and less abundant. Pelvic peritonitis demands hospitalization. The patient is placed in the Fowler position, ice is freely applied to the pelvis and two hot douches a day are prescribed. In addition, general hygienic, supportive and dietary measures are instituted, fluids are forced and the bowels are evacuated by a low suds enema, care being taken not to contaminate the rectal nozzle during its introduction.

Gelhorn of St. Louis has recommended the injection of foreign protein, securing beneficial results because of the increased leucocytosis. Injections of 5 cc. of boiled, sterile milk may be given deeply in the buttock. I have preferred to use 10 cc. injections of Aolan, a lactalbumin preparation with the irritating properties of the milk removed, which is given deeply in the buttock with a two inch needle and causes but little reaction. This form of treatment is carried out for five successive days, and, if necessary, may be resumed after an interval of a few days.

Diathermy has also been helpful in selected cases, due to improvement of the circulation rather than to the heat destruction of bacteria, and must, therefore, be used in conjunction with other methods of treatment. It is especially indicated in young women with a first attack of pelvic inflammatory disease, in whom acute symptoms and fever are not present. It is of less value in recurrent cases. When there is marked reaction, shown by severe pain or an increased temperature, it should for a time, at least, be discontinued. It should never be used in the presence of fever, in cases of pelvic peritonitis, during menstruation or when there is profuse flowing resulting from inflammation. More recently the heat treatment of Elliott has been recommended in the treatment of inflammatory conditions in the pelvis, the heat reaching the pelvis by the circulation of hot water through a special apparatus. The advocates of this method claim excellent results, while others are less enthusiastic. The procedure has not been used extensively but offers another means of bringing heat to the inflamed pelvic organs.

If a pelvic abscess develops, as it sometimes may, it is evacuated through the cul-de-sac of Douglas and the pelvis is drained with iodoform gauze. Tubo-ovarian abscesses are similarly drained. Operative treatment on the pelvic organs is deferred as long as possible and becomes unnecessary in over fifty per cent of the patients. If resolution and improvement fail to take place and the third stage, or stage of degenerative processes becomes established, operation has to be resorted to. In the young woman, where ovarian conservation is important, the removal of the tubes with a wedge of the fundus of the uterus may be practised with satisfactory results. The wedge of fundus is excised in order to remove the uterine horns and to avoid the later occurrence of salpingitis isthmica nodosa. The lips of the uterine fundus are approximated by interrupted catgut sutures. The ovaries are sutured to the round ligaments with fine catgut, to prevent their prolapse, and the bladder is detached from the uterus and attached to the posterior surface of the retained uterus· thus covering over all raw areas and keeping the organ in forward position. If the two ovaries cannot be saved it is frequently possible, in these young women, to save one. The retained ovary or ovaries, it is true, may occasionally have to be removed, some years later, usually at the time of the menopause because of cystic degeneration, but, in my opinion, it is far more simple for the younger woman to submit to a second laparotomy than to have a total castration followed by the severe symptoms which it entails early in life. In the older group of women the uterus should be removed supravaginally, together with the tubes and ovaries, and, in addition, the cervix should be coned from above, thus removing the entire endocervical mucosa and eliminating the cervical discharge which is always a source of reinfection. Rarely is the total ablation of the uterus indicated and this only in the presence of deep lacerations and marked cystic degeneration of the cervix.

For children the treatment consists of, 1—a hot sitz bath three times a day; 2—insistence upon catharsis and water; 3—boric acid powder is freely applied to the introitus and retained with a pad of absorbent cotton; 4—soap and water cleanliness and care to avoid mechanical irritation are advised; 5—a solution of one teaspoonful of antiseptic powder of the National Formulary to a pitcher of water is poured over the parts at night.

TRICHOMONAS VAGINALIS

Vaginitis, caused by the trichomonas vaginalis, is of importance in this discussion since, in the past, this lesion has so frequently been mistaken for gonorrhea. It occurs more frequently than is suspected, since careful research has demonstrated it in a high percentage of women suffering from vaginitis. Trichomonas vaginalis is a flagellate parasite, characterized by the presence of four flagellae anteriorly which become adherent at their common base. The organism may be cultured directly on the Lynch medium, one part of human serum to ten parts of 0.5 per cent salt solution, or by modifying this by the addition of hydrocele fluid. The mode of transmission has not been elucidated, thus we find it in virgins, in adult women, in pregnant women, in old women with senile vaginae and it has also been found in a child three years of age. Without the microscope, the clinical diagnosis made is practically always gonorrhea. Antihygienic conditions are thought to be a predisposing factor. One may harbor trichomonas vaginalis without any manifestation other than a slightly pronounced vaginal discharge. In most instances, however, the acute process is typical, the complaint being pruritus, more or less severe, in the region of the vulva and vagina, and, occasionally, pain. There then appears a discharge of variable intensity, which eventually brings about alterations of the soft parts. The vaginal examination is frequently very painful, showing the vaginal mucosa to be covered by a greenish-yellow discharge which is filled with air bubbles, and in places fine granulations are found, giving to the mucosa a strawberry appearance. When the discharge is sponged away, the vagina appears red and the mucosa is friable to the slightest touch. The cervical erosions, described by Kleegman as characteristic, have been seldom discovered by others. The clinical cure is not difficult to obtain, but in order that it may be complete, it has to be controlled by the microscope.

Several forms of treatment have been recommended, that of Sophie Kleegman being efficacious. This consists of thoroughly scrubbing the vagina and the cervix with tincture of green soap, of drying the mucosa and of painting it with pyroligneous acid, of again drying the parts and of filling the vaginal tube with tampons covered with Lassar's paste. These are removed at the end of two days and the treatment repeated. One of the essential requirements is to keep the vaginal mucosa dry and, with this end in view, many gynecologists have substituted kaolin powder for Lassar's paste. After treating the vaginal mucosa with soap and pyroligneous acid, the entire vagina is filled with kaolin by means of a suitable blower. All patients should be examined after several periods, as recurrences are apt to take place at the time of menstruation and the treatment should be carried on for some time after the protozoa have disappeared. Pregnancy offers difficulties in the destruction of the organisms, since it is not feasible to apply vigorous treatment during this state. I have found that the use of 4 per cent mercurochrome suppositories with a glycero-gelatine base have given the best results. Finally, only the microscope will decide whether the patient is cured.

POSTPARTAL AND POSTABORTAL INFECTION

Puerperal Infection

Great progress has been accomplished in the reduction of the incidence of puerperal infection since the era of Oliver Wendell Holmes and Semmelweiss. Despite all the care in the aseptic and antiseptic conduct of labor, however, isolated cases constantly exist and epidemics occasionally appear. In more recent years, Watson has fearlessly reported the epidemic which occurred at the Sloane Hospital for Women in New York and which was traced to the streptococcus found in the nose and throat of the delivery room attendants. A small epidemic, which had its origin from the same source, was reported by Kellogg before the American Association of Obstetricians, Gynecologists and Abdominal Surgeons at the September, 1932 meeting. Within two years I had the unfortunate experience of dealing with a small epidemic which originated on my service when a woman, who had cared for her children suffering from scarlet fever which was prevalent in the locality where she resided at the time of her entrance to the hospital, was delivered in the maternity service and developed the disease herself the following day. Notwithstanding the improvements in antisepsis and asepsis, puerperal infection is still responsible for the largest number of maternal deaths, the rate being about 2.5 per one thousand live births, and there has been no definite reduction of this incidence in the last quarter of a century. Attempts to improve this situation are constantly being made. The New England Obstetrical and Gynecological Society has appointed a committee to study puerperal sepsis in the New England States; a committee representing the cities of Boston, New York and Philadelphia has recently been formed to investigate infections during childbirth, and a third committee of the Section of Obstetrics and Gynecology of the Massachusetts Medical Society has reported for the five years previous to June, 1932 on the same subject. Puerperal sepsis today engages the attention of all those interested in obstetrics.

Puerperal infections and inflammations may be divided into three categories: 1—puerperal infection and inflammation with local suppuration; 2—puerperal infection and inflammation with migratory suppuration and 3—hypertoxic and non-suppurative infection and inflammation.

In the genesis of these disorders we find the streptococcus as the predominating agent, followed by the gonococcus and the colon bacillus. Others of a less virulent nature are responsible for less serious infections, as for example sapremia.

The extragenital origin of septicemia will be found in such extrinsic foci as the teeth, the tonsils, the breasts, the gall bladder, the liver, the pancreas, the gastro-intestinal and the urinary tracts. Pyelitis, a frequent complication of the puerperium, presents a symptomatology which closely resembles that of puerperal fever. In North America the complication seems to show a predilection for the cold season and the largest number of such infections are found in the months of January, February and March. The intrinsic foci of the infection will be found in the genital tract with the following routes of inoculation—the perineum, the cervix, the uterus, which may contain placental and membranous débris or may be infected itself, the uterine adnexa, the pelvic peritoneum, the parametria, the general peritoneal cavity, the pelvic veins, the blood stream and the lymphatic circulation.

Prophylaxis

The improvement of the future in puerperal sepsis must come, it seems to me, through prophylaxis. A great deal has been said for and against rectal examinations in the last decade. Be that as it may, I am convinced that this type of examination plays an important rôle in preventing infection. This statement is based on an experience of fourteen years with the Obstetrical Service of the Carney Hospital, during which time all labors have been conducted by means of rectal examinations. The vagina is invaded for three reasons only—to rupture the membranes, to apply forceps and to perform an internal podalic version. The morbidity during the puerperium has been kept at a very low point during these years. The dry preparation of the genitals before delivery by means of ether, iodine, picric acid and other antiseptic preparations seems to me to be more logical than the soap and water scrub followed by the flushing of the parts with a large amount of aqueous antiseptic solution. I never could reconcile myself to the fact that the vagina was not contaminated during this performance, since the vaginal introitus is usually gaping at this stage of labor and affords ready entrance to the soap and water which had come in contact with the parts about to be cleansed. The introduction of mercurochrome or other antiseptics in the vagina ahead of the presenting part has found some advocates. Mayes of Brooklyn, by instillations of mercurochrome—220 soluble, during labor, has shown statistically a slightly reduced morbidity during the puerperium in parturients so treated as compared with a like group where this procedure was omitted. I have always felt that the internal genitals would take care of themselves if no infectious material was introduced from the outside, and have spent my efforts in a painstaking and thorough external preparation, although I am willing to recognize that the introduction of antiseptics may be of advantage. The wearing of masks, covering the nose and mouth, should be required of all attendants entering the delivery room, to avoid infection coming from the upper respiratory tract.

At the Carney Hospital we go a step farther and mask all mothers while nursing their infants.

The low or cervical cesarean section, which has been steadily gaining in popularity during the last fifteen years, has been a factor in preventing sepsis. This method has greatly reduced the mortality from peritonitis when it has become necessary to perform an abdominal delivery after the rupture of the membranes and after a long labor.

Treatment

The treatment of puerperal sepsis varies with the location of the infection and has become, in the last quarter of a century, more and more conservative. Good nursing, good hygiene and supportive measures are essentials. Puerperal septicemia streptococcus antitoxin has, in my experience, definite value if administered early enough. This is put up in 10 cc. syringes, each syringe containing 500,000 units. I have given three to four doses or 1,500,000 to 2,000,000 units in each case where I have employed it. This serum, of course, has but little effect when given to a moribund patient. The intravenous injection of chemical substances, such as mercurochrome and others, in an attempt to sterilize the blood stream has not come up to our expectations and has been given up in most clinics. In the presence of an infection of the perineum, the sutures are removed, the cicatrization left to nature and a subsequent repair is performed some months later. Infections of the cervix and extension to the abundant lymphatics of the parametria may be avoided to a certain degree if extensive lacerations of this organ are carefully and aseptically sutured immediately after the third stage of labor. This, however, should be attempted only in a well-equipped hospital, where due respect to asepsis may be observed and where a suitable number of assistants are available. The sutures should be so applied that the external os is left roomy enough to allow the escape of the lochia without hindrance and they should be tied loosely to prevent the cutting of the tissues rendered edematous by obstetrical trauma.

Retained products in the uterus in a great number of cases require no intervention, their separation and evacuation occurring spontaneously. In a smaller group, however, retention of these products may provoke the appearance of serious symptoms. When the exploration of the uterus becomes necessary it should be practiced early, at the onset of the infection, before it has passed the limits where a purely local treatment may control it. Uterine exploration becomes necessary in the presence of two conditions—abundant hemorrhage and the pain occasioned by expulsive uterine contractions. The uterus should be emptied with a minimum of trauma so as not to break through nature's protective leucocytic barrier. My preference is to remove the products by means of ring or sponge forceps and to pack the uterus with iodoform gauze, which, upon its removal, will enmesh any particles left behind. I believe that the use of the curette in such cases is not only unnecessary but dangerous. In the presence of a severe streptococcus infection only a light iodoform pack is used to control hemorrhage, otherwise the separation and expulsion of the retained secundines are left to nature. Meanwhile, the patient is given the best possible supportive treatment accompanied by the administration of anti-streptococcic serum.

Infection of the uterus, which generally starts at the level of the placental attachment, results in an endometritis and a septic metritis, and propagates by three distinct avenues: 1— the uterine mucosa (endometrium)—This is the case of infection caused by the gonococcus resulting in a pyosalpinx, a tubo-ovarian abscess and pelvic peritonitis. 2— The lymphatics of the uterine mucosa, giving rise to a pelvic cellulitis or septicemia. 3— The blood stream, the infection originating at the placental site, spreading through the veins and giving origin to thrombophlebitis, pyemia and septicemia. To be efficacious, the treatment of acute uterine infection should be instituted early and, in the opinion of the large majority of obstetricians, should be conservative. Here again hygienic and supportive measures are in order, and repeated small blood transfusions have proved to be of real value and frequently life saving. Recourse should also be had to the puerperal streptococcus antitoxin and everything should be done to help the patient limit the disease by her own resistance. It is for acute puerperal infection of the uterus that hysterectomy, abdominal and vaginal, has been advocated in the past, but this procedure has been a source of controversy in most of the Gynecological and Obstetrical Congresses of the last three decades. In reviewing the literature, as I had occasion to do fairly recently, I noted that heated discussions were participated in by its proponents on the one hand and its opponents on the other. However, hysterectomy, for this condition, has been abandoned practically everywhere and I personally know of only two advocates of this procedure in the United States. I have never resorted to the ablation of the uterus in acute puerperal uterine infection, since the operation has but little or no value when the infection has spread beyond the confines of the uterus and since I know of no reliable method which will assure me that it is still limited. Multiple abscesses in the uterine wall would be the main indication for hysterectomy in puerperal sepsis, which complication I met in 1930. A primiparous patient with a grave uterine infection developed an abscess of the uterine wall

at the fundus, which was allowed to localize and when it pointed through the abdominal wall was incised and the drain introduced directly in the uterine cavity. She recovered and is alive and well today. In the absence of this localization, hysterectomy would have been indicated. In 1927 two young women, infected in their homes and sent to my Service in a precarious condition, came under my observation. They were treated conservatively for three months, after which time they were given large blood transfusions. Subtotal hysterectomy, with ablation of the adnexa, was performed and a Mikulicz drain introduced in the pelvis. Both were operated upon at a time when the temperature had become normal and both recovered. I am convinced that the result would have been entirely different had surgical intervention been resorted to during the acute stage of the disease.

Infection of the uterine tubes may be the result of the exacerbation of an old gonorrheal process during the puerperium, or a puerperal inflammatory process may spread along the endometrium causing a puerperal pyosalpinx. The symptoms of the former are never so severe as those of the latter. The gonococcic infections respond satisfactorily to conservative treatment and, except for drainage, should never be operated on until they have cooled and have become chronic. On the contrary, when the diagnosis of pyosalpinx of puerperal origin has been made with a reasonable certainty, its ablation with free drainage is indicated because retention of this infectious focus exposes the patient to septic peritonitis by extension through the fimbriated end of the tube or by rupture. Moreover, this tube acts as a metastatic focus and, without operation, fever and pain persist without any serious chance of resolution.

Infection of the ovaries during the puerperium may occur through two avenues—by extension through the fimbriated extremity of the tube, forming a tubo-ovarian abscess, or by the lymphatics taking origin in the uterus, extending along the ovarian ligaments and resulting in an ovarian abscess. What has been said about the treatment of infection of the tubes applies equally to the ovaries and needs no further elaboration.

Pelvic abscess is a purulent collection in the cul-de-sac of Douglas, resulting from drainage of infectious material through the fimbriated extremities of the tubes. This condition is usually associated with salpingitis, oöphoritis and pelvic peritonitis. If the streptococcus is the causative agent the symptoms of this infection can become most alarming. Happily this purulent accumulation lends itself to a simple surgical intervention—posterior colpotomy and vaginal drainage. In the presence of the streptococcus the abdominal route should be avoided, to prevent dissemination in the peritoneal cavity and a septic peritonitis, which may frequently be fatal.

Pelvic cellulitis, a lymphangitis of the connective tissue surrounding the uterus, is caused by the streptococcus, the staphylococcus or the colon bacillus. The treatment is conservative and the result will be resolution or the formation of a broad ligament abscess.

Broad ligament abscess appears as a sensitive fluctuant mass in the region of the affected ligament. A large quantity of pus is rarely found, but frequently a small amount of seropus is discovered at the center of the indurated mass, and the drainage of this small amount of material, which may be vaginal or abdominal, depending upon where the abscess points, is usually sufficient to bring about resolution. Vaginal drainage is established through the cul-de-sac of Douglas. When the abscess points high, above Poupart's ligament, the broad ligament should be exposed extraperitoneally and drained. The general peritoneal cavity should be scrupulously avoided for fear of general peritonitis. Recently I so treated a young woman, five months after her initial streptococcic puerperal infection. She made an excellent recovery without complications.

Phlebitis and thrombophlebitis: Septic phlebitis often followed by thrombosis of the affected vein is one of the most feared complications of puerperal infection. Discordance between the pulse and temperature is frequent. On examination there is an elongated, circumscribed, sensitive mass and the uterus is large and in a stage of subinvolution. It is occasionally possible, in cases where the process is limited to the pelvic veins, to ligate the thrombosed veins above the thrombus on a non-involved portion of the vein, but in extensive thrombophlebitis ligature is contraindicated and the patient should be treated conservatively, notwithstanding the high mortality of this inflammatory process.

In puerperal peritonitis we should resort to free drainage of the peritoneal cavity and of the intestine, followed by the Fowler position and supportive treatment. An enterostomy will permit the evacuation of the toxic products and the introduction of fluids such as glucose solution directly into the intestine and will result, in a number of instances, in recovery of the puerpera who otherwise is usually lost. Rest, posture, the arrest of intestinal peristalsis, opium for the relief of pain, hypodermoclysis and venoclysis should all be given due consideration.

Septicemia and pyemia may result from the dissemination of the infection by the blood stream or through the lymphatics from a pelvic cellulitis. The treatment is medical and supportive rather than surgical. Sera and vaccines are administered in order to build the resistance and to control the intoxication; blood transfusions have been recommended but have never been very successful, and ligature of the veins

has been attempted without encouraging results. This form of puerperal infection is so virulent that the patient usually succumbs before the local lesions manifest themselves, although occasionally a woman so infected may be saved by sera and conservative treatment. Within three months I saw, in consultation, a young woman in the early twenties, who, thirty-six hours after delivery by a classical cesarean section, showed a streptococcus hemolyticus in her blood stream, the same organism having been recovered from her throat. Her temperature had risen to 107.6°. She was given four injections of puerperal septicemia streptococcus antitoxin, 10 cc. (containing 500,000 units) to each injection together with two blood transfusions, 300 cc. each. She was otherwise treated conservatively, and, although at the onset her condition looked hopeless, she has none the less recovered and was discharged well at the end of two and one-half weeks.

TUBERCULOUS INFECTION

Tuberculosis forms the third large group of infections of the female pelvic organs and, in contradistinction to gonorrhea, is descending in character. The peritoneum is primarily involved and the disorder spreads, by continuity, to the tubes, in the form of a perisalpingitis and endosalpingitis, then to the endometrium. Infection as the result of tuberculosis in the male and transmitted by the seminal fluid is exceedingly rare, although it may occasionally occur. Transmission through the blood stream in an individual afflicted with tuberculosis of the lungs or of some other remote organ is also considered unusual. The tubes are always bilaterally affected, the process then extending to the uterine mucosa, the cervix, the vagina and the vulva in the order named. The ovaries consistently take part in the inflammatory condition. The vaginal mucosa is resistant to the infecting organism when intact, but the opposite is true when there is solution of continuity. The tubal mucosa and the endometrium are very sensitive to the tubercle bacillus. With the decrease of this disorder in general and with the improvement in the treatment of pulmonary tuberculosis, the incidence of this condition has gradually decreased. In my own experience, it is much lower than it was two decades ago. Pelvic inflammation in virginal women is tuberculous in origin in a very high percentage of the cases. The symptoms of the affection are those of pelvic inflammation of a mild type, and of tuberculous peritonitis. The disease develops insidiously and is more resistant to treatment than are the other forms of pelvic inflammation. There is usually found a focus of infection elsewhere. The treatment of genital tuberculosis is directed toward the proper climate, superalimentation, rest over a long period of time and the use of all measures which help to build up the patient's resistance. When the acute symptoms have subsided surgical interference becomes indicated. This should generally be in the form of a total hysterectomy, since the cervix is frequently involved, together with the ablation of the adnexa. The patient should then resume her medical régime and should be kept under observation for a considerable period of time.

STATISTICS

The records of the patients with pelvic inflammation in the first stage, or stage of infection, who were treated in the Outpatient Departments, as well as in the office, were not tabulated. A large number of cauterizations of the cervix were done in this group. I have looked up my personal records from May 7, 1917 to November 15, 1932, a period of approximately fifteen and a half years, and have arranged in tables the operations performed on the women in the second stage, or stage of pelvic invasion and in the third stage, or stage of degenerative lesions.

TABLE I

CHRONIC ENDOCERVICITIS AND LACERATION OF CERVIX

Cauterization of cervix	39
Conization of cervix, (Hyams)	43
Trachelorrhaphy	235
Amputation of cervix	135
Total	452

TABLE II

PELVIC ABSCESS

Extraperitoneal drainage	1
Vaginal drainage	11
Abdominal drainage	14
Vaginal and abdominal drainage	3
Total	29

TABLE III

TUBO-OVARIAN ABSCESS

Abdominal drainage	1
Salpingo-oöphorectomy with drainage (Vaginal or abdominal)	5
Supravaginal hysterectomy bilateral salpingo-oöphorectomy	10
Panhysterectomy, bilateral salpingo-oöphorectomy	1
Total	17

TABLE IV

CHRONIC PELVIC INFLAMMATION

Hysterectomy

1—Vaginal	2	
2—Panhysterectomy	24	
3—Supravaginal	89	
4—Fundic	8	
Total		123

Adnexa

Unilateral salpingectomy	13	
Bilateral salpingectomy	105	
Unilateral oöphorectomy	22	
Bilateral oöphorectomy	95	
Total		235
Grand Total		358

TABLE V

PELVIC ADHESIONS

Lysis of adhesions	1
Lysis of adhesions and suspension of uterus	6
Total	7

TABLE VI

GENERAL PERITONITIS

Necrotic ovarian cyst, right. Right cystectomy. Cecostomy. Drainage. Recovery	1

TABLE VII

TUBERCULOUS PELVIC PERITONITIS

Supravaginal hysterectomy Bilateral salpingo-oöphorectomy	1

TABLE VIII

COMPLEMENTARY OPERATIONS

Anterior colporrhaphy	38
Colpoperineorrhaphy	4
Colpectomy	2
Total	44

TABLE IX

MORTALITY

There were 909 distinct operations performed on 537 women. Five women died, a mortality of 0.9 per cent.

Causes of Death

Shock	1
Sepsis	1
Septicemia	2
Erysipelas and pneumonia	1
Total	5

CONCLUSIONS

1. Pelvic infections in women may be divided into three large groups, namely, gonorrheal, postpartal and postabortal, and tuberculous. Other less important infections also exist.
2. Trichomonas vaginalis vaginitis is frequently mistaken for gonorrhea and should be ruled out in the diagnosis of this disorder.
3. The treatment of gonorrhea is conservative during the first stage or stage of infection and during the second stage or stage of pelvic invasion, with the exception of draining a pelvic or a tubo-ovarian abscess. During the third stage, or stage of degenerative lesions, surgical intervention is frequently indicated to return the patient to health.
4. Puerperal infections are discussed and the prophylaxis and treatment indicated. Here again the best results are obtained by conservative and supportive measures, by repeated small blood transfusion and by the administration of puerperal septicemia streptococcus antitoxin.
5. Surgery in puerperal sepsis consists of removing sutures from an infected perineum, of draining a pelvic abscess vaginally or extraperitoneally, if it points above Poupart's ligament, and of removing the uterus for multiple abscesses of the uterine wall.
6. The tendency of the times in the treatment of puerperal septicemia is directed toward conservatism. Hysterectomy, vaginal and abdominal, is seldom used and has been abandoned by most obstetricians and gynecologists.
7. Tuberculous infections play a minor rôle in the female pelvis. Their treatment is climatic, dietary and hygienic during the acute stage and surgical during the chronic stage.
8. My personal records, covering a period of approximately fifteen and a half years, show that 909 distinct operations for pelvic infections of all types were performed on 537 women, with an uncorrected mortality of 0.9 per cent.

PRIMARY CARCINOMA OF BRONCHUS

A Report of Two Cases—Diagnosis By Bronchoscopy and Biopsy

BY G. ARNOLD RICE, M.D.*

THE following two cases were admitted to the Rutland State Sanatorium with a diagnosis of pulmonary tuberculosis. History and physical examination of these cases in brief follow:

CASE I. Mrs. D. M., aged 29. Admitted January 6, 1931.

Family History:

Mother died at forty-six years of age of cancer of the breast. One half brother was a patient at the Sanatorium twenty years ago, but is well now.
Possibility of tuberculosis on maternal side. Otherwise unimportant.

Past History:

Tonsillectomy at thirteen years of age. Scarlet fever in 1928 followed by pneumonia; dry

*Rice—Bronchoscopist to Rutland State Sanatorium, Rutland, Mass. and to Worcester County Sanatorium, West Boylston, Mass. For record and address of author see "This Week's Issue," page 364.

pleurisy on the right side since pneumonia. Curettage of the uterus at eighteen. Appendectomy at twenty-six.

Exposure to Tuberculosis:

No contact with half brother who was a patient in the State Sanatorium in 1910. Probability of tuberculosis on husband's side.

Occupation:

Began to work in a skirt factory at the age of fifteen and worked there for six years. During that period worked six months in a candy shop. Has done only housework since her marriage. Gave up all kinds of occupation in March, 1930, because of present illness.

Onset:

Hemorrhage (hemoptysis). Ill since spring of 1926.

Present Illness:

In the spring of 1926 the patient had a hemoptysis consisting of a couple of mouthfuls. She paid little attention to this because of lack of other symptoms, such as cough, expectoration, etc., but tired easily, however. Being in the second month of pregnancy, she ascribed the lassitude to this but reported the fact to her family physician. She went through the pregnancy without accident. In October, 1928, she had scarlet fever followed by a severe form of bronchopneumonia. Recovery from that illness was rather poor; she has since had frequent pleurisy pains in the base of the right lung. She became pregnant for the third time in November, 1929, and began to lose weight simultaneously. In December she had a productive cough with blood-streaked sputum. In February, 1930, she raised a cupful of blood. In March, hemoptysis recurred of seven or eight ounces. She still had a persistent productive cough and was then advised to go to a sanatorium. In the meantime she was admitted to the Waltham Hospital, April 9, 1930. In June, 1930, hemoptysis was repeated of six ounces of blood. On August 18, 1930, she was delivered of a normal baby. Recovery from this third pregnancy was greatly delayed and she left the hospital on October fifteenth. While at home she did some light work. In December, 1931, she had slight hemoptysis and a week before admission, blood-streaked sputum.

Chief Present Complaint:

Pain in the chest retrosternally.

Cough:

Began in the fall of 1929. Decreased for some time, then increased and becomes productive after hemoptysis.

Expectoration:

Denies expectoration after hemorrhage. None at present. Examined in December, 1929, for tubercle bacilli and reported negative.

Night Sweats:

For four or five weeks in March, 1930, she sweat heavily; she was pregnant at this time.

Strength:

Good.

Weight:

Maximum 170 lbs.; minimum 104 lbs.; usual 135 lbs.; present 164 lbs. She had gained thirty pounds (including the fetus) since entering the Waltham Hospital.

Fever:

Ninety-nine degrees Fahrenheit and over, a few days following hemorrhage.

Dyspnea:

Slight on exertion. She states that at times she wheezes. She gives a description of a condition accompanying wheezing similar to ataxia of the right arm.

Nothing else of value obtained in present illness.

PHYSICAL EXAMINATION

General Development:

Skeleton and musculature well-developed.

Height:

Five feet, six and one half inches.

Weight:

One hundred and sixty-four pounds.

Teeth:

Teeth and gums in defective condition due to pyorrhea. Gums discharging pus.

Glands:

Thyroid gland enlarged; slight tremor of extremities.

Eyes:

Protruding. No masses in neck or axilla.

Chest:

Inspection: Expansion diminished on the right side. Right clavicular fossa exaggerated.

Palpation: Tactile fremitus increased over right apex.

Percussion: No appreciable change in chest resonance.

Auscultation: Right lung: fine râles heard from top to fourth dorsal spine, posteriorly, and to second rib, anteriorly. Whispered voice sound increased at apex. Harsh breathing heard at base of scapula with pleural friction rub.

Left lung: Fine râles heard below clavicle.

Physical examination otherwise reveals nothing abnormal.

X-RAY REPORT

January 13, 1931

Costosternal cartilages are calcified. Right hilum covered by uniformly dense shadow. Mid-portion of right lung appears to be infiltrated.

March 25, 1931

Costosternal cartilages are calcified. Hila are enlarged and denser than normal, especially the right. There are numerous calcified nodules throughout both hila. Middle portion of both lungs near the hilum in each appears mottled.

May 27, 1931

After bronchoscopy and insufflation of bismuth subcarbonate powder, a shadow of the bismuth shows narrowing of the right lower stem bronchus at the level of the seventh dorsal vertebra.

LABORATORY REPORTS

Basal Metabolism:

Plus 6.2; patient calm and quiet during entire operation; respirations regular.

Sputum Examinations:
Twenty examinations, all negative for tubercle bacilli.

Guinea Pig Inoculations:
Inoculation with sputum—negative for tuberculosis. Inoculation with material aspirated directly from the right bronchus uncontaminated with mouth organisms—negative for tuberculosis.

Cultures:

April 8, 1931
Cultures of material aspirated directly from bronchus on crystal violet potato, no growth at six weeks; on agar, gram positive bacilli, gram positive cocci. Direct smears from material from bronchus—no tubercle bacilli found. Few gram bacilli and cocci. No fusiform bacilli or spirilla found.

Smear

April 29, 1931
Specimen from bronchus, secretion mixed with blood. Smears examined for cells undergoing mitosis. None found.

PROGRESS NOTES

February 12, 1931
Clinical conference.
Staff cannot agree as to diagnosis. Doctor Emerson does not believe it is tuberculosis. The other members of the Staff are not ready to commit themselves.

Another clinical conference.
Present: Doctors Emerson, Nadeau, LaRoche, Paquette, and McCarthy.
Patient has lost ten pounds since February twelfth. She is ambulatory. Amount of expectoration is sufficient to cover the bottom of box. Doctor Emerson suggests lateral plates, bronchoscopy and reëxamination; his opinion is unchanged. Doctor LaRoche agrees with Doctor Emerson.

April 8, 1931.
Bronchoscopy.
Right stem bronchus appears narrowed and in the lower portion there is the possibility of a growth. Clear vision not obtained because of profuse bleeding. Small amount of mucus and blood aspirated directly from bronchus. Sent to laboratory for examination.

April 22, 1931
Bronchoscopy.
Tumor seen in lower portion of stem bronchus just below middle lobe bronchus extending into one of the openings of the lower lobe bronchi. The tumor bleeds very easily. If it is touched with aspirating tube lightly, profuse bleeding is produced. Further observation is contemplated. Patient has had no wheezing since first bronchoscopy and the periodic attacks of ataxia in the right arm have disappeared.

April 29, 1931
Bronchoscopy.
Biopsy. Specimen sent to laboratory for examination.

May 4, 1931
Pathological report received.
Diagnosis: "Organized Blood Clot." (Shields Warren, M.D., Boston.)

May 13, 1931
Bronchoscopy.
Previously described tumor mass seen. Small piece for examination removed with biopsy forceps.

May 19, 1931
Pathological Report.
Microscopic diagnosis: "Insufficient for diagnosis." (Shields Warren, M.D., Boston.)

May 20, 1931
Bronchoscopy.
Growth in previously described location appears larger than a week ago. Another piece removed with punch forceps sent to laboratory for diagnosis.

May 24, 1931
Report from pathological laboratory.
Diagnosis: "Organized blood clot." (Shields Warren, M.D., Boston.)

June 17, 1931
Bronchoscopy.
Tumor still seen in same location. Piece about the size of a pea removed with punch forceps. Sent to laboratory for examination.

June 18, 1931
Diagnosis: "Bronchial Adeno-carcinoma." (Timothy Leary, M.D., Boston.)

June 25, 1931
Clinical conference.
Staff including Doctor Churchill, Consulting Thoracic Surgeon.
In view of last pathologic report, staff recommends patient's transfer to Massachusetts General Hospital for observation and possible operation. Transferred July 6, 1931.

CASE II. Mr. J. D. Aged forty-two. Admitted to the State Sanatorium July 6, 1932.

Family History:
Family history reveals nothing of importance.

Past History:
Diseases of childhood: pneumonia at ten years of age.
Otherwise nothing of importance obtained.

Exposure to Tuberculosis:
No known source of infection.

Occupation:
Started work at the age of fourteen. Occupations in order: one—farming; two—sanding (sands bells) for past twenty-one years. Boss himself, had six workers. Stopped work in November, 1931, due to present illness.

Present Illness:
About fourteen months ago started to suffer from dyspnea. Shortly afterward started coughing and raising. Noticed pain in right side of chest when he coughed and had blood-streaked sputum simultaneously. Has been losing weight and strength. Feels worse this spring.

Expectoration:
Noticed one year ago and still present. Raises four boxes of thick, frothy, yellowish sputum a day, at times blood-streaked.

Night Sweats:
Occurred a year ago. None recently.

Strength:

Began to notice loss of strength in November, 1931. He is ambulatory.

Weight:

Maximum 165 lbs., at thirty-five years of age; minimum 126 lbs., at present; usual 160 lbs. Began to lose weight in January, 1932.

Pain:

Soreness on right side of chest only on breathing. Started November, 1931.

Fever:

Not known.

Appetite:

Began to lose appetite during the past year.

Mental Attitude:

Rather dull and placid.
History not satisfactory; patient is Polish and speaks very little English.

PHYSICAL EXAMINATION

General Development:

Fairly well developed, rather poorly nourished, thin white male. Skin slightly lemon colored. Height five feet, four and one-half inches. Weight one hundred and twenty-six pounds.

Mouth:

Teeth in poor condition.

Glands:

Cervical glands enlarged on right side.

Extremities:

Clubbed fingers; otherwise normal.

Chest:

Inspection: Limited expansion—right side.
Palpation: Voice conduction and tactile fremitus increased over upper third of right lung posteriorly.
Percussion: Dullness over upper two-thirds of right lung.
Auscultation: Bronchial breathing and medium moist râles heard throughout right lung.

Heart:

Rate 120 per minute. Nothing else abnormal found.

Pulse:

Fair quality, rate 120.

Blood Pressure:

104/70. Vessels normal.

X-RAY REPORT

July 9, 1932

Left side: Hilum is heavy. Lung markings are prominent throughout.
Right side: The trachea and entire mediastinal content are pulled toward the right; the diaphragm also is pulled upward. The entire right chest is entirely obliterated by a uniformly dense shadow which coalesces with that of the mediastinum.

LABORATORY REPORT

Sputum Examination:

Twenty examinations, all negative for tubercle bacilli.

Blood Examination:

Hemoglobin: 75 per cent; red corpuscles 4,300,000; leukocytes 130,700; color index .8; differential count; neutrophils 70½ per cent, small lymphocytes 18 per cent, eosinophils 15 per cent, mononuclears 10½ per cent.

SOME OF THE DAILY NOTES

July 21, 1932

Clinical conference.
Present: Doctors Dufault, LaRoche, Nadeau, C. K. McCarthy, Kahalis, and R. D. McCarthy.
Doctor Dufault believes the patient has a cancer of the lung because of his appearance, history, frequent small hemoptyses, and loss of weight. Dr. C. K. McCarthy considers bronchiectasis or lung abscess. Doctor Nadeau considers multiple lung abscesses. All agree that a thoracentesis and a bronchoscopy should be performed.

July 25, 1932

Thoracentesis was done. No fluid aspirated.

July 27, 1932

Bronchoscopy.
Considerable injection of the trachea and right bronchus.
Just above the opening of the right middle lobe bronchus was found a mulberry shaped growth nearly occluding the bronchus. The mass was partially ulcerated and bled easily. Biopsy was done. Lower lobe bronchus aspirated; considerable amount of mucus removed.
Bronchoscopic diagnosis: bronchial neoplasm.

July 28, 1932

Laboratory report of biopsy specimen. Diagnosis: "Epidermoid carcinoma, Grade Two." (Shields Warren, M.D., Boston.)

July 29, 1932

Clinical conference.
Present: Doctors Churchill, Dufault, LaRoche, C. K. McCarthy, Kahalis and R. D. McCarthy.
Doctor Churchill considers the patient too far advanced for any surgical interference and recommends his transfer to the Pondville Cancer Hospital at Wrentham.

August 5, 1932

Transferred to Pondville Hospital, Wrentham.

END RESULTS TO DATE

CASE I. Mrs. D. M.—Operated on by Dr. Edward D. Churchill at the Massachusetts General Hospital on August 10, 1932. A right bi-lobectomy (middle and lower lobes) was successfully done. (This case was reported with operative technique, etc., in the February, 1933 issue of the *Journal of Thoracic Surgery* by Doctor Churchill, page 257, case 4-D.M.)

A letter from the patient received March 3, 1933 states, ". . . you wish to know how I am feeling. I am really feeling in the best of health at the present time. I have two of my children at home with me. I am able to care for them and to do my own housework."

A letter from Doctor Churchill received on March 3, 1933 states, ". . . I saw Mrs. D. M. at the Massachusetts General Hospital two weeks ago. Her wounds are entirely healed; she is carrying on her housework and leading an active normal life. There is no evidence of recurrence of the disease."

CASE II. Mr. J. D.—Discharged from Pondville Hospital on August 25, 1932. Died at home, Rutland, Massachusetts, October 15, 1932.

COMMENT

It will be readily seen in these two cases that there was considerable difficulty in making a definite diagnosis without the aid of the bronchoscope. Bronchoscopy, biopsy, and laboratory examination established a very definite diagnosis.

It would seem that with the advance in thoracic surgery which is being demonstrated today, the treatment of malignant disease of the lungs, as elsewhere in the body, is greatly dependent on the making of an early diagnosis by the clinician.

We wish to emphasize the fact that bronchoscopy is of value as an aid to the clinician in making a definite diagnosis in bronchiogenic carcinoma.

Thoracic surgery is without question going to hold out hope to many cases of bronchiogenic carcinoma, when diagnosis is made early, where in the past by the time definite diagnosis was made there was no hope, the case being far advanced with metastases to the lungs as in Case II.

In the past, no doubt, many cases have died undiagnosed and many have died with a diagnosis "suggesting" malignancy and definite diagnosis made at autopsy.

Any patient with an unexplained cough should have a bronchoscopy.

Any case of hemoptysis not proved to be tuberculosis should have a bronchoscopy.

Bronchoscopy can be done under local anesthesia, general anesthesia is never necessary, and bronchoscopy can be done in a few minutes without too great inconvenience to the patient.

WHAT WE HAVE LEARNED FROM FIVE HUNDRED SPINAL ANESTHESIAS*

BY FRANK H. WASHBURN, M.D.†

WE find, in Biblical as well as in ancient and medieval literature, recorded evidences of the aim to ameliorate the pain of surgical procedure. Methods varied from effort to produce limited cerebral concussion by a restrained tap on the cranium, to the administration of narcotics orally and vapors and gases by the respiratory tract. Cannabis indica, particularly hashish, mandragora, opium and hyoscyamus were at times in vogue. As early as 1661, hypnotism was successfully applied. However, no surgical analgesia practical to any extent was known until the discovery of the pain-abolishing effect of sulphuric ether in 1842 by Crawford W. Long, of Georgia, and its practical demonstration by William T. G. Morton, a Worcester County product, in 1846. This discovery determined the beginning of the modern surgical era and rendered operation painless.

Ether stands today the sheet-anchor of the anesthetist to which all cling in certain times of need. Ether and chloroform have served humanity well, but remote dangers, as well as immediate undesirable features, led students of anesthesia to hope for something nearer the ideal. It can be definitely stated that the hope of an ideal anesthetic still seems far from realization as evidenced by the constantly increasing appearance of new drugs and methods. Nevertheless, selective anesthesia as practiced by those who devote their professional activities to the specialty, although not ideal, is of great assistance to the surgeon and gives to the patient relative comfort and safety.

It is our misfortune to be so situated that the availability of a professionl anesthetist is at present impracticable and we have been forced to adopt the next best scheme, that of depending upon a nurse experienced in inhalation anesthesia and upon our own technique in ingestion and injection methods.

We are wedded to no particular procedure, selecting ether, nitrous oxide and ethylene as we believe they are indicated, and infiltration and regional block, including subarachnoid anesthesia, as we think proper. Experimental trial of preliminary sedatives and so-called basal anesthetics convinces us that there are many useful agents and that further progress in the field is to be desired and expected.

It will be seen by these preliminary remarks that in presenting our impressions gained from study of our cases of subarachnoid anesthesia, done by the Pitkin method, we do not wish to convey the idea that it is a procedure suitable for all purposes.

We are basing our opinion, so far as formed, upon five hundred anesthesias with spinocaine, done by my associates at Holden Clinic and me, up to March, 1933, together with gleanings from the experience of others. Complete analysis was possible of but four hundred and fifty, due to the fact that some of the records were not sufficiently complete for the purpose and others less available, representing cases outside the two principal hospitals in which we do most of our work, Holden District Hospital and the Rutland State Sanatorium.

*Read before the Wachusett Medical Improvement Society, at Worcester County Sanatorium, April 5, 1933.

†Washburn—Surgeon and Chief of Staff, Holden District Hospital. For record and address of author see "This Week's Issue," page 364.

We have followed the technique of Pitkin[1] in its essentials. The spinocaine has been mixed with varying amounts of spinal fluid according to the level of anesthesia desired and we have never exceeded 300 milligrams of the drug, nor a volume of nine cubic centimeters. The Trendelenburg position has been maintained at all times up to a minimum of two hours following the close of operation. In each instance recovery has occurred under the constant watch of a nurse who has been taught the principles involved. This we believe important.

Four hundred and fifty operations are classified as follows:

Appendicitis	155
Gynecological	83
Gall-bladder and ducts	59
Stomach	14
Urological	40
Rectal	37
Herniae	32
Bones and Joints	8
Miscellaneous	22

There were twenty-one postoperative deaths from all causes, or 4.6 per cent.

Analgesia was recorded as:

Perfect	250
Satisfactory	110
Good	33
Fair	7
Incomplete	41
Not satisfactory	7
Failure	2

i.e., four hundred were sufficiently good to complete operation, fifty requiring the added use, to some degree, of other agents.

Postoperative headache was recorded in 113 cases, or 25 per cent as follows:

Slight	20
Moderate	79
Severe	13
Very severe	1

In reviewing our cases of this, the most heralded complication of spinal anesthesia, we noted not a few in which it was present on admission, but if it persisted postoperatively, it is reported. As a rule the discomfort was not marked and it was relieved by lowering the head. In fourteen it was real. Spinal headache occurs oftenest on the third or fourth day. It rarely occurred, off and on, during most of convalescence and in one case in diminishing severity four or five weeks after discharge.

Postoperative shock, our records indicate, was present in twenty-seven cases:

Slight	8
Moderate	16
Severe	3

Shock occurred only where long trauma was produced or in obviously poor surgical risks or where additional anesthetics were used. We have found no major anesthetic procedure so seldom followed by shock.

Vomiting, usually trivial, has occurred in one hundred and ninety-one cases. Rather severe vomiting occurred ten times. In not a few cases, the patient vomited before and on admission. All cases are reported if the vomiting persisted after operation. We believe spinal anesthesia not infrequently causes vomiting. It does not prevent vomiting caused by disease or operation.

Blood Pressure Averages:

Before operation	128/76
At finish of operation	117/69
Lowest during operation	110/67

Hypotension, as registered by the sphygmomanometer, occurred in four or five cases, during nausea, and was evanescent, except in the three cases later reported. They are considered in the above averages.

We no longer consider low blood pressure, per se, a contraindication. On the other hand, if a patient presents hypertension, we are inclined to study the risk carefully.

The average pulse prior to injection was 94; when the operation was completed, 99. Nervous apprehension sometimes accounted for a rapid pulse in the beginning and later steadied. Sometimes an increasing rate occurred. Little variation was the rule.

Eighty-seven of the four hundred and fifty cases were patients with pulmonary tuberculosis. The majority were advanced, many far advanced, and not a few subjects of tuberculous complications in other organs, notably the seminal and urinary tracts. There were seven deaths in the group, none of which could be construed as due to the anesthesia.

It is desirable that an agent be chosen for anesthetizing the pulmonary patient which will contribute as little as possible to shock, will not abolish the cough and swallowing reflexes, interfere with normal respiration or irritate the bronchial mucosa. While the heart ought not to be ignored, it seldom gives occasion for anxiety, inasmuch as this group is composed of comparatively young subjects who are seldom obese. As a rule the tuberculous are comparatively hypotensive.

Bevan[2] states, "Spinal anesthesia may have a proper place in a very limited field. It is difficult for me to visualize a field of any extent in which spinal anesthesia is properly the anesthetic of choice."

We realize that our series is too small to warrant dogmatic statements, but we cannot avoid the conclusion that surgery in the tuberculous constitutes the field that Doctor Bevan has difficulty in visualizing.

Respiratory tract complications most of which were light, occurred in ten cases, or 2.2 per cent. This may seem a low incidence in view of recent literature. McKittrick, McClure, and Sweet[3], in their statistics, appear to show that lung complications are even greater than after ether. We have not analyzed our recent ether records, but obviously lung complications, in our experi-

ence, have been much greater and more important following the use of that anesthetic. Avoidance of high anesthesia levels, absolutely uninterrupted Trendelenburg posture and use of a lighter-than-spinal-fluid solution may be technical factors in avoiding postanesthetic lung complications. Of course, operations about the diaphragm invite respiratory sequelae regardless of the anesthesia.

Postoperative general itching was recorded twice.

Chill occurring in the first twelve postoperative hours, where no other cause could be found, occurred twice.

Pain along one thigh and leg occurred in three cases. One had gradually diminishing pain three or four weeks after discharge.

The nurse recorded evanescent respiratory hes itation in one case.

A sensation of tightness in the chest was occasionally mentioned by the patient while on the table.

There are elements of danger in the use of any of the major anesthetics, remote in some, manifested perhaps as changes in tissues after periods of time, as in the liver changes following chloroform administration. In spinal anesthesia the dangers are apt to be manifested by immediate phenomena, and thus are more striking. We should evaluate well the causes of the occasional disaster to the end that it may be avoided. Bower, Clark, Wagoner, and Burns[4], in the department of surgical research of Temple University, have, by carefully conducted experiments on dogs, extending over a period of several years, brought out important facts bearing upon certain clinical aspects of subarachnoid block. Those who would use spinal anesthesia would do well to become familiar with their findings. We quote them briefly, "We have always known that the extent of upward diffusion determines the degree of shock. . . . The knowledge that cardiac dilatation, with thoracic stagnation of blood may be an accompaniment of spinal anesthesia makes it possible for us to understand more clearly the catastrophes that have occurred in the past and to outline a routine to follow for selecting and protecting patients in the future, who are candidates for spinal anesthesia." They show that myocardial impairment explains unfavorable reaction. Clinical reports of disasters and near-disasters, in the literature and in our limited experience, have impressed us with the predominance of gall bladder cases in this hazard group. Bower, Clark et al, show that "marked fall in blood pressure is mainly cardiac" and that "artificial respiration offers the best means of combating respiratory embarrassment and fall in arterial pressure."

It must be conceded that one may operate upon the head, neck, and thorax and "get away with it". Koster and Kassman[5] claim that these procedures are safe and universally applicable. They justify this view by experiments on frogs and guinea pigs which indicated selective action upon sensory nerves by anesthetic agents and suggested that the "motor mechanism is particularly resistant to anesthetic action." There seems to be logic in Labat's[6] warning, "There are other procedures of regional anesthesia which give entire satisfaction for operations on the head, neck, and thorax. The use of spinal anesthesia for surgery of these parts of the body has, in the hands of its pioneer advocates, occasionally been followed by disastrous results. . . . We should not make an abusive use of spinal anesthesia for fear of losing one of the best instruments of our armamentarium."

In a small group of unchanging personnel where one can feel perfectly sure his patient will not be let out of the Trendelenburg posture, the Pitkin method may well be one's choice. We would fear its possible dangers if we mistrusted our team. Prior to 1929 we used novocaine dissolved in spinal fluid and while it was an improvement over the still earlier solutions used and we experienced no disasters, we did receive a fright or two.

The facility with which one may operate in an abdominal cavity with intestinal coils dropped back motionless and with complete muscular relaxation surely redounds to the patient's benefit. Difficult operations sometimes become easy and otherwise impossible ones become possible.

It is not our purpose to win converts, however, by dwelling upon the many attractive features of the procedure; we aim rather to impress those who would use it with their responsibility to become familiar with the untoward possibilities and their prevention. Spinal anesthesia may be made relatively safe, but never if thoughtlessly or carelessly used. It behooves us to evade the myocardiac, avoid high levels of diffusion, be sure of what happens to the patient after leaving the table, and be prepared for combating respiratory failure in the subject of unrecognized damaged heart muscle.

February 25, 1931.—Mrs. Nellie S., aged 38; housewife. Blood pressure 180/110. Obese, plethoric. There was a high blowing systolic murmur. Heart sounds were distant, pulse quality only fair. Operation was done under spinal anesthesia. Gall bladder operation intended; exploration made, and because of diseased appendix, also present, appendectomy was begun, during which patient became cyanosed. Adrenalin was given without effect and the patient died upon the table of heart failure. At autopsy left ventricular hypertrophy was noted. There was an old organized blood clot lodged in the right auricle extending through the auriculoventricular valve and into the right ventricle.

We do not consider this death due to spinal anesthesia. However, it was a case in which no form of anesthesia other than infiltration was safe and the patient was a poor risk for any procedure regardless of anesthesia. It is mentioned as the question of anesthesia came up be-

fore autopsy was done, and represents a type in which subarachnoid block is obviously contraindicated.

August 4, 1932.—Mrs. Emma S., aged 51. Operated on for acute appendicitis. Obese, sedentary. Heart sounds clear, pulse normal, blood pressure 100/60. During operation the patient became cyanotic, respiration ceased, blood pressure fell to zero. Caffein, sodium benzoate, adrenalin and artificial respiration were given. Operation was suspended. After four or five minutes the patient began to breathe again and the operation was finished. At close the blood pressure was 110/60, pulse good quality, 116, color normal. Convalescence was uneventful.

Whether this patient had gall bladder disease we do not know. She was the type for it. She undoubtedly had unrecognized myocardial impairment and was not a proper risk for this kind of anesthesia. The anesthesia in our opinion precipitated the phenomena.

December 20, 1932.—Mrs. M., aged 48; housewife. Well nourished, with a fat abdomen, no cardiac enlargement, no murmurs, blood pressure 114/88, pulse 80, regular. History of convulsive seizures in youth. A cyst of the broad ligament the size of an orange and a gall bladder contracted upon a large calculus were removed, the former through a Pfannenstiel incision and the latter by the common gall bladder technique. The pelvic operation was closed uneventfully. About the time of beginning the second operation, gas oxygen inhalation was started as pain was complained of when traction upon the gall bladder was done. The administration was done by a house officer, but directed by the anesthetist constantly at his side. During the gall bladder procedure respiration ceased abruptly. Artificial respiration was begun and continued for half an hour, when the pulse weakened and stopped. While Dr. Rice, who had been called, was preparing for bronchoscopy, fifteen minims of adrenalin chloride solution were injected into the heart muscle. The myocardium reacted and the pulse returned. Mucus was removed by means of the bronchoscope. Oxygen and CO_2 were insufflated by the same means until two hours and ten minutes after the respiration had ceased, when the normal respiratory mechanism again resumed function. Operation was finished during the insufflation. Following this, frequent convulsions, at first not severe, but increasingly so, came on and continued to recur. The patient did not regain consciousness, but died on the following morning. Permission for necropsy was not obtained.

While there was a diversity of opinion at our staff conference, we feel that it is fair to suspect the anesthesia, probably the spinal, as the major etiological factor in the death.

Gleaning from experimental and clinical evidence furnished by others, and adding the lessons of our experience in this small series of five hundred cases, it is our conviction that spinal anesthesia is a very attractive and relatively safe method of surgical analgesia in the hands of careful specialists in the art. The rest of us may properly use it providing we recognize fully its contraindications. We shall continue its use, in selected cases, we trust with continued satisfaction, but we hope with increased intelligence.

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MORTALITY RATES

Telegraphic returns from 85 cities with a total population of thirty-seven million for the week ending July 29, indicate a mortality rate of 10.0 as against a rate of 9.5 for the corresponding week of last year. The highest rate (21.0) appears for Memphis, Tenn., and the lowest (3.2) for Yonkers, N. Y. The highest infant mortality rate (11.9) appears for Atlanta, Ga., and the lowest for Bridgeport, Conn., Des Moines, Ia., Duluth, Minn., Fall River, Mass., Fort Wayne, Ind., Salt Lake City, Utah, Schenectady, N. Y., Somerville, Mass., and Yonkers, N. Y., which reported no infant mortality.

The annual rate for 85 cities is 11.3 for the thirty weeks of 1933, as against a rate of 11.7 for the corresponding period of the previous year.—*Bureau of the Census.*

A STUDY OF THE SOURCE OF TULAREMIA

Dr. Robert G. Green, bacteriologist of the University of Minnesota, has arranged to carry an expedition to the far North for a study of tularemia with the purpose of finding the source of this infection. He will establish research laboratories with a qualified research staff. Tularemia is more or less prevalent in most of the United States with only rare cases in New England.

If Dr. Green is successful in establishing the initial source of the infection, the expense of this expedition will be justified.

THE NEW HAMPSHIRE MEDICAL SOCIETY

PRESIDENT'S ADDRESS*

BY HARRY O. CHESLEY, M.D.†

IN conformity with the established custom of this society which directs that its President present to its members what it has been pleased to define as an address, I present the following:

Let me say at the beginning that I am not offering you anything new or anything that has not been said before. What I have to say I have already brought to the attention of most of you and, in reading the addresses of the former presidents of this society for the past 30 years, I find that seven of them have stressed the ideas which I am about to reiterate to you. The reason that I again call them to your attention is that the necessity for so doing was never so apparent as at the present time, that the urgency is real and is one of the major interests of the medical profession at this time.

I realize that this custom is an appropriate one in that it affords an opportunity to discuss topics, other than scientific, to make a general survey of our profession and, while we profit from the lessons of the past, we must evaluate in present-day realities, and it also allows of an opportunity to deal with the confused conditions arising from the present social and economic changes. The tendency between physicians and medical societies, toward the public, is being clearly reflected in the growing tendency to the establishment of an entirely new basis of public and professional relations, on the part of the medical profession. While the scientific importance will always be primary in the functions of our medical societies, yet the life of the world has become so changed by the accomplishments of medicine itself, and the activities of the physician so greatly modified by developments of social, economic and political character, that medical organization must recognize the importance of these changed conditions. There is a feeling, among even an intelligent part of our people, that our attitude toward these matters is negative, and that the credit for making practical use of medical advance belongs in great measure to social workers, philanthropists and public-spirited laymen.

The practice of medicine formerly was a phase which was independent of, and but little influenced by, other phases of medicine. But through our changed social conditions it has in its practical application become secondary to, and more or less dependent upon, those other phases with which the public is becoming familiar. Organized medicine today is not called upon to defend itself in a scientific way, because medicine as a science has beyond all doubt proved itself to all except the severest of its critics.

Now in meeting the demands of science, medical organization has been accomplished to the extent that its function has been adequate, but in so doing it is becoming more apparent that it has failed in proper recognition of the problem of social medicine and as a consequence, the profession is suffering from the folly of its own neglect.

The question of what the future holds in store for medical practice should occasion more than a passing thought in the minds of all thinking medical men. When the depression is over, will the practice emerge retaining its present characteristics and methods?

Today seems to be recognized as the most propitious time to attack the doctor at the weak spot in which financial adversity has placed him, and efforts are being made to induce him to change from his present uncertain and underpaid status. He must realize, if he has observed the trend over even a short period of years, that the sources from which he may expect to derive his livelihood, are being slowly but surely narrowed. The complexities of modern society, and the not too remote possibility that changes or attempts at change of the age-old traditions of our profession and the institution of new and unproved methods of practice make it highly desirable that we should establish an entirely new basis of public and professional relations. The duty of the organized profession is to see that any or all proposals for changes from whatever source shall be carefully examined as to their ultimate value.

The probable reason why business men, philanthropists, and the laity in general, have attempted to do so much regulation of medical practice, is the fact that physicians in general have given little attention to their economic protection.

The physician's whole training and environment have been such that his chief concern rests with diagnosis and treatment; and the act of dispensing these services becomes one of scientific aspect, but due to the fact that he expects, and occasionally receives, a reward for his services, such an act has an economic value as well. So it is evident that the practice of medicine is economic as well as scientific. The individualism and independence which exist in the private practice of medicine concentrate one's mind on his own small environment and cause him to forget or neglect its social aspect. Scientific med-

*Read at the Annual Meeting of the New Hampshire Medical Society at Manchester, May 16, 1933.

†Chesley—President of the New Hampshire Medical Society 1932-1933. For record and address of author see "This Week's Issue," page 364.

icine seems to have engrossed us to such an extent that we seem to believe that with this armament alone we will always be able to carry on the practice of medicine to the exclusion of all other fundamental agencies which we must admit have become of such paramount importance not only in medicine but in other professions and trades as well. It seems to me that the individual who centers his interest alone on the scientific side of medicine today, is ignoring the demands which an economic world is making on his profession and shifting the responsibility in this direction to others.

The public has been quick to recognize our failure in dealing with social and economic problems and as a result has taken the opportunity to set up lay standards of medical control in an ever-increasing expansion. We, on account of lack of proper organization, lack of foresight and indifference, have sat idly by, and as a result, we now bow to lay direction. Too much and too long have we been followers in matters pertaining to our own business. We limit the publicity of these subjects to our medical journals, but we never contact the public and we leave it to draw its own conclusions and base its opinions on propaganda from lay publicity departments, insurance companies, social workers, cults and the like.

Now, I agree, that publicity is not a proper field for private practice, but as a function of the medical profession it promises to bring into closer harmony lay and medical opinions, a better understanding of professional purposes and a more thorough knowledge of public needs. Publicity is an agent that can, when properly directed, mold public opinion which would be for the good of the public welfare and the profession as well.

The medical profession has much to offer the public along the lines of social and economic medicine but the public mind will not be open to conviction until organized medicine becomes more fully alive to its duty in this direction. We have already attempted to educate the public along scientific lines to a point where it is unable to assimilate facts and this has set up within it a sort of superiority complex with which it is now difficult to cope.

The public is interested today not so much in the science of medicine as such, but in the practical application of this science. There is no question in my mind but that today the relation between the medical profession and the public is undergoing a marked change. The public is educated to what it wants. It gets from the newspapers and the radio what it expects to receive from the medical profession and it is ready to demand it, for the medical profession exists for the public and public opinion must furnish the final solution.

Now private practice is not a field for social and economic medicine. Only through organized effort is it possible for medicine to impress the public and bring to its consciousness the fact that it is aware of its needs and is willing and capable of meeting its demands in fulfilling the necessary requirements of an age of changed social conditions.

Organization is absolutely necessary today not only for the good but for the preservation of the medical profession. The policies of such an organization must be intelligent and devoted only to those interests of the profession which are in accord with sound social policies, and to see to it that it remains worthy of respect and leadership.

Now publicity, public relations, public education, public policy, public information, or whatever you wish to term it is more of a state, than a national problem because the ordinary citizen reads localized material with much more interest and conviction.

An increasing number of state societies are setting up bureaus and getting the professional viewpoint properly presented to the public, and have established agencies through which influential lay groups can be reached and through which such groups can reach our societies for mutually helpful conferences and for the formation of intelligent plans for coöperative effort.

The medical profession must recognize its responsibility to the community. Under the high ethics of the profession it can do no less and the layman should understand what the doctors are doing, the patience they are displaying, the sacrifice of time and skill they are making, and the cheerfulness with which they are volunteering to do their full share of relief and community safeguarding.

And may I express the hope, that as the method of medical service to the people changes from time to time in order to adapt itself to the changing times and conditions of our changing civilization, the doctor may observe the need and not only point the way, but lead the way in whatever changes may be needed.

Now gentlemen, I am making the plea that for our own welfare we should recognize the fact that there must be a better relationship and unity of one physician to another, and that we should have some definite program for the establishment of better relations between organized medicine and the public by the creation of an authorized agency by the state society. Further, that it shall be publicly known and recognized as such, that we may get the professional viewpoint properly presented to the public in order to promote better understanding and better relationship between the profession and the public.

And to borrow from Kipling:

> For this is the law of the jungle,
> It's as old and as true as the sky.
> And the wolf that heeds it will prosper,
> But the wolf that forgets it must die.
> Like the ivy that circles the tree trunk
> This law goeth forward and back.
> For the strength of the pack is the wolf.
> And the strength of the wolf is the pack.

URINARY RETENTION: OUTLINE OF CAUSES AND TREATMENT*

BY PETER J. DOYLE, M.D.,† DOVER

PERHAPS no condition can prove itself so elusive, its origin of such importance, and its misinterpretation so disastrous as urinary retention. It is for the distressing symptoms rather than the actual primary cause, that the patient seeks the advice of his physician. But the underlying cause may be so masked that without proper grouping of the etiological factors, one is seriously handicapped in making a correct diagnosis. This is of paramount importance, for the loss of time results in increased renal damage, incorrect diagnosis, and in unnecessary surgery.

I have found in my experience, both among interns and practitioners, that there is a distinct lack of grouping of the causes of retention, the proper correlation of which is so necessary for correct diagnosis.

It is with this idea in view, that I have perfected a certain routine, which I believe, because of its simplicity, will be helpful to the general practitioner.

Age is no mean factor in determining to which disease our bodies fall heir. One correlates scarlet fever with childhood and adolescence; and likewise one associates gonorrhea with the passionate period of youth, rather than with the doddering old gentleman in the evening of life.

Accordingly, we may group the causes of urinary retention, arbitrarily in the following age periods.

I. Infancy and childhood.
II. Early manhood.
III. Over 50 years of age.
IV. Common to all age periods.

I. Infancy and childhood.
   A. Congenital.
      1. Phimosis.
      2. Atresia of the external meatus.
      3. Congenital valves of the urethra.
   B. Urethral strictures.
   C. Tumors of the Prostate.

II. Early manhood.
   A. Venereal in Origin.
      1. Acute Prostatitis.
      2. Prostatic abscess.
      3. Stricture.
   B. Stricture non-venereal.

III. Those over 50 years of age.
   A. Prostatic Abscess, non-venereal.
   B. Hypertrophy of the Prostate.
   C. Carcinoma of the Prostate.

IV. Common to all age periods.
   A. Trauma to the Urethra.
   B. Foreign bodies in the Urethra.
   C. Neuropathies.
   D. Postoperative Retention.
   E. Contracture of the Bladder Neck.
   F. Vesical Calculi.

Certain congenital conditions should be looked for at birth. Campbell reports three cases of phimosis, in which uremic death resulted.

Congenital atresia: the external meatus, in which the meatus is "pin point", may be present.

Examination at birth in the male structures of the penile strictures should be routine. Early circumcision, in the case of phimosis, and meatotomy in the case of congenital atresia of the meatus, result in immediate cure.

Congenital Valves: mucosal reduplications may be present. They usually pass from the verumontanum to the urethral walls. These are best treated by high frequency current, using a cysto-urethroscope. In some cases passage of a sound results in a cure.

Tumors of the prostate gland in infancy and childhood are rare, although I have seen a sarcoma of the prostate in a boy sixteen years of age, causing complete retention. On rectal examination the condition could not be differentiated from prostatic abscess. However, on emptying the bladder by catheter, and repeating rectal examination, the prostate seemed to be somewhat firmer than one correlates with the feel of an "abscess". It was only slightly tender.

Such condition can be treated only palliatively at best. A suprapubic cystotomy to relieve the retention, and radiation therapy offer the best hope of relief.

Errors in diagnosis are those of "omission rather than commission". In cases of male children especially, examination of the external genitals and percussion of the abdomen should never be neglected. Rectal examination using the little finger is oftentimes of value. Adherence to this simple dogma will occasionally solve a puzzling condition.

Conditions causing urinary retention in early manhood are usually venereal in origin. By far the large majority of men first contract

*The Trustees of the New Hampshire Medical Society awarded a prize to Dr. Peter J. Doyle for this essay.

†Doyle—For record and address of author see "This Week's Issue," page 364.

gonorrhea between the ages of eighteen and twenty-five.

Simple gonorrheal urethritis in itself is never the cause of urinary retention. Complications, however, are a different story.

Acute prostatitis as a general rule does not cause retention. However, complete urinary retention may be the result. A history of gonorrhea usually contracted one or two weeks previously, with suprapubic pain, pain in the perineum and rectum, and some previous terminal hematuria is the common story. A urethral discharge may or may not be present. Percussion generally reveals the height of bladder distention above the symphysis. Rectal examination usually reveals a prostate many times enlarged, firm, irregular, but with no fluctuation. Frequently one or both seminal vesicles will be found enlarged, indurated and irregular. Rectal examination should be gentle as it is painful and should also roughly substantiate the fact that there is retention present, for usually the anterior rectal wall and prostate encroach greatly upon the rectal lumen.

Heat in the form of hot rectal irrigations, two to three times per day, and hot sitz baths, will generally control the condition. Catheterization with a small soft rubber catheter every six hours will control bladder distention, until the patient is able to void.

Urotropin and allied drugs should not be given under any circumstances. Occasionally as the patient improves tenesmus reappears. This is easily controlled by the use of sandalwood oil minims x, three or four times per day.

Although acute prostatitis is generally not associated with retention, on the contrary prostatic abscess is. With abscess formation the pain in the rectum is more severe and the patient complains of a feeling of fullness in the perineum.

Rectal examination will reveal a tense mass in the region of the prostate, which is tender and imparts the sensation of fluctuation to the examining finger. On rectal examination one should obtain an idea of the size of the prostate; the amount of periprostatic invasion, and whether the abscess is still within the prostate.

Patients with prostatic abscess of non-specific origin, contrary to some authorities, are usually older than those whose pathology is of venereal origin. I have seen four such patients. The age period was between forty and fifty years. In two instances diabetes complicated the picture as a contributory factor. While the mortality is low in patients with prostatic abscess of venereal origin, conversely it is high in patients afflicted with prostatic abscess of non-venereal origin.

Fever is usually present both in acute prostatitis and prostatic abscess but for the purpose of diagnosis this item is not essential.

One may use heat in this condition, as outlined for prostatitis, if the abscess is small. One may also apply heat per rectum by using the Elliott method. This method makes use of a distensible rubber bag per rectum, through which water circulates, the temperature being gradually raised to 130 degrees F.

A great number of prostatic abscesses rupture per urethra, thus solving their own problem. For a small prostatic abscess of venereal origin, definitely limited to the prostate, the sound operation described by Dr. A. R. Stevens in 1927 may be used.

It has the advantage of shortening the patient's period in the hospital. It is, however, contraindicated in cases of prostatic abscess of non-venereal origin.

For larger abscesses and those in which there is much periprostatic involvement, the open operation, via the perineal route is the method of choice. This, however, necessitates a period of hospitalization of eight to ten days.

Stricture of the urethra is a common cause of urinary retention.

Generally, the patient gives a history of gonorrhea some few years previously. Histories of two or even three previous attacks of gonorrhea are frequent. Often a history of heroic treatment of a previous gonorrhea is elicited.

Patients with acute retention, giving a history of previous gonorrhea with urethral discharges present from a new infection, are not infrequent. Rather it is the infection superimposed upon the old scar, which has caused the retention.

Patients who know they have a urethral stricture and have neglected treatment until acute retention finally necessitates urgent measures, are not uncommon.

Rarely one will see a patient whose chief complaint is incontinence of some months' duration. I remember seeing one such patient. This patient was above the average age, approximately forty-four years old. Percussion of the abdomen revealed a bladder midway between the symphysis pubis and umbilicus. Rectal examination was of no assistance. Reflexes both pupillary and of the extremities were questionable enough to tempt one to make a diagnosis of "cord bladder," due to tabes dorsalis.

Yet upon urethral instrumentation, an almost impossible stricture of the bulbous urethra was found.

In examining for stricture, the age period and history are important. Percussion of the abdomen will reveal the extent of bladder distention. It is next a very good rule to examine the genitals and in no instance should the perineum be overlooked. The scrotal urethra should also be palpated for areas of enlargement, induration and tenderness. Often one will be able to palpate a hard, almost cartilaginous

area along the course of the urethra, which can be interpreted as a definite indication of stricture. Furthermore, with fever present, the palpation of the course of the urethra will frequently bring to light a periurethral abscess before it has assumed the proportions of a "phlegmon".

Rectal examination will serve to rule out prostatic conditions as a source of the existing retention.

Urethral instrumentation should above all things be gentle. One should also strive to make the procedure as aseptic as possible. Usually, retracting the prepuce and washing the glans penis with green soap and water is sufficient for the external parts. One should then proceed to irrigate the anterior urethra with 1-5000 acriflavine solution, that it may be as bacteria-free as possible. The injection of sterile mineral oil will facilitate instrumentation.

One can then introduce a F. No. 20 sound to locate the stricture. This should be done gently and with no pressure. A Phillips whip may then be introduced and manipulated. I have found that a gentle stroke, moving the whip up and down, about one and one-half inches each time with a twirling motion imparted by the finger, serves best. One may introduce other whips to fill false pockets in the stricture. Another trick is to fashion the tip of the whip into a cork screw, by using a mosquito artery forceps.

Should the stricture be one of long standing and the retention complete, it is best to be content with merely passing the Phillips whip, which can be tied in place by means of adhesive and thread. The patient should be kept in bed, and should he be in much pain, sedatives may be given. It is advisable to wait a few hours before contemplating further procedure, for it sometimes requires a little time for the edema about the stricture to subside. The whip should be left in twelve to eighteen hours. The patient voiding around the whip, will slowly decompress his bladder.

There are two points to bear in mind. One is asepsis: Urethral chill means bacteriemia and may be severe. It is not uncommon for the fever to rise to 105° or 106° F., during a chill. Metastatic foci, such as acute joint conditions, have followed.

Rapid dilatation of a stricture, when the patient is in retention, has been followed by death within fourteen hours. For this reason it is best to be content in the majority of patients of this type merely to pass a Phillips whip per urethra to the bladder, and tie it in place for twelve or fourteen hours. Thereafter the whip may be removed, another whip inserted and dilatation carried out by means of a follow-up sound. One should not as a rule raise the size of the follower more than three or four French at any one dilatation, otherwise the result will be added trauma and bleeding, which means increased scar formation.

Above the size of 20 French, ordinary sounds may be passed.

In cases where the stricture does not lend itself to dilatation readily, operative procedure may be carried out. Internal urethrotomy by means of a urethrotome and catheter drainage thereafter for a few days is usually sufficient. However, passage of sounds periodically must be carried out, postoperatively.

External urethrectomy may be indicated. In the pendulous urethra however, it should never be done. There has been a tendency of late to limit this procedure to those cases in which infection is present; that is periurethral abscess superimposed on the stricture.

The English usually favor suprapubic cystotomy in cases of stricture with retention. The theory is that with the stream diverted, the reaction in the area of the stricture will subside and the stricture will then respond to dilatation. This does not always follow. I remember one instance in which I was able to pass a Phillips whip with F. No. 9 metal catheter attached on two occasions. However, after suprapubic cystotomy, I was unable to pass even a whip. An external and internal urethrotomy was eventually done.

Rarely one will see a particularly resilient type of stricture causing retention. I have seen one. I was able to pass a F. No. 16 follower on a whip easily and the patient was able to void a good stream on its withdrawal; he returned within two days again in acute retention. Breaking the rule of allowing four to five days between the passage of sounds, dilatation was carried up to F. No. 24; the condition persisted with retention of urine. An internal urethrotomy was done, up to the point where a F. No. 32 sound passed easily. Three days after discharge from the hospital, the patient was once more in acute retention. In these cases, which luckily are few, external urethrotomy alone suffices, with excision of the scar tissue. As a rule more than one operation is necessary before an effective result is obtained.

One should impress on all patients with stricture, that if passage of sounds is not carried out religiously at definite intervals of increasing length, retention will again result.

The conditions causing retention of urine in men of fifty or over are few. Benign hypertrophy of the prostate and carcinoma of the prostate, almost to the exclusion of all other conditions, are the causes of acute retention in this age period.

Patients with retention due to benign hypertrophy of the prostate as a rule give a history of nocturia over a period of a year or

more; combined with this, they may complain of slowness in starting the urinary stream. As the condition progresses, a period in which the residual urine increases in amount ensues and the above signs become aggravated. Day frequency may become marked. Constitutional symptoms, due to impaired renal function, such as indigestion, loss of appetite and weight, thirst and pallor, are more manifest as time elapses. In some instances the patient complains of heaviness in the perineum and hypogastrium.

Finally, after exposure to cold, sexual or alcoholic excess, the small opening in the prostatic urethra, sufficient for ordinary use, closes due to the resultant congestion and a period of acute retention ensues. Occasionally a patient is seen with acute retention, due to benign prostatic enlargement, who gives very little, if any, history of previous urinary difficulty. Rarely the condition of acute retention will be complicated with profuse hematuria. I remember two such patients. One in particular was suffering from profuse hemorrhage from the urethra and suprapubic palpation revealed a greatly distended bladder due to instrumentation.

Only recently, I was called to see a patient 59 years old, who was exposed to the chilly waters of a large New Hampshire lake in the month of April, and after driving 30 miles was unable to get out of his car.

Acute retention in his case was accompanied by chills and fever, pain in the bladder region, and a clonic contraction of all the muscles of his body. He also complained of being paralyzed and could not move for several days.

After the usual preliminary treatment, vasectomy, cystotomy, and finally after a suprapubic prostatectomy, he went on to a rapid recovery.

Suprapubic pain is severe in any type of acute retention, but, if the retention is gradual and of long duration, the discomfort due to a greatly distended bladder may be limited to a feeling of fullness in the suprapubic region; the patient's real concern being that he has not been able to void for some few hours.

Rectal examination usually reveals a smooth elastic prostate with obliteration of the median sulcus but deepening of the lateral sulci. Occasionally, the hypertrophied prostate is broad and more or less flat. At times, very little if any enlargement is disclosed on palpation. However, the size of the prostate per rectum is no indication of intraurethral encroachment. Should one be able to detect little, if any, rectal enlargement of the prostate, after suitable preliminary treatment, cystoscopy must decide the cause of the treatment.

Treatment of patients in retention should be conservative. As a rule, the patient is well along in years. Unless the history of retention is one of acute onset, with practically no history of previous urinary upset, decompression is usually the best procedure to follow. It is best to err on the side of safety and decompress such patients, rather than subject one to the tragic error of emptying the bladder at once.

A soft rubber catheter can be passed per urethra to the bladder with little difficulty in most cases. If this is unsuccessful, a soft rubber catheter, stretched on a mandrin guide can be fairly easily passed. This procedure requires some skill, however. Gentleness with no pressure upon the handle of the instrument is imperative. It must be remembered that gentleness and lightness of touch are absolutely essential in all urethral manipulations. Creation of false passages through the prostate to the bladder or even into the rectum has occurred.

The silk woven natural curve catheter F. No. 14 or No. 16 can at times be gently passed when all other methods fail.

In instances where urethral instrumentation fails, suprapubic cystotomy is the only alternative. Although cystotomy is indicated, decompression should be carried out. This can be done by use of a purse-string suture in the bladder wall. A Pezzer catheter with mushroom tip (stretched by means of a curved Kelly forceps, inserted through one of the lateral apertures and the opposite end clamped) can readily be inserted through a stab wound made within the suture line. The clamp is quickly withdrawn, the mushroom tip is then pulled up tightly against the suprapubic opening, and the purse-string suture is tied with the escape of very few drops of urine. Decompression may be carried out very simply by means of a Y glass tube. One of the short arms of the Y tube is attached to a rubber tube, which in turn is connected to the indwelling catheter or suprapubic tube of the patient to be decompressed, by means of a small glass connecting tube; the opposite arm of the Y is attached to a tube which leads to a drainage bottle. The third arm of the Y tube is kept upright, thus allowing "air" balance to the stream and preventing suction. The Y tube is held in place by means of a stand at such a height that only a few drops of urine may spill on slight coughing and is lowered two inches every four to five hours. This procedure to be effective should take at least forty-eight hours.

One is at the present time in a quandary to know just how to deal with the prostatic obstruction itself. Some authorities claim that all cases can be treated by means of transurethral operations; in view of our present knowledge and stage of advancement, this attitude is premature. For the large benign, elastic prostate, either one stage or two stage prostatectomy (depending on the condition of the patient) still offers the best and safest hope of relief.

For the small firm fibrous prostatic obstruc-

tion and types which are known to us as median bar, or middle lobe hypertrophy, and similar obstructive conditions known as contraction of the bladder neck, the transurethral method, using the Stern-McCarthy, or, Collings instrument, has been yielding the best results. One must remember, however, that in this era of enthusiasm through which we are passing, transurethral surgery is being tried with varying results on every type of prostatic enlargement. Various complications of which hemorrhage from the excised area is the most frequent have been reported. Other complications such as retroperitoneal hemorrhage, perforation of bladder, pyelonephritis and persistent urinary incontinence have taken place.

Success in transurethral surgery depends upon the use of the cystoscope for diagnosis and the instrumental skill of the operator. In short, it is a field for the specialist.

Carcinoma of the prostate is not so rare as previously believed. It is met with in what might be termed increasing frequency in the arger clinics, probably due to our growing knowledge and skill of diagnosis. Contrary to the belief that carcinoma generally arises in the posterior lobe of the gland, it has been proved, pathologically, to arise from any portion of the gland.

Usually patients suffering from retention of urine, due to carcinoma of the prostate, are in the advanced stage of the disease. So the description of a much enlarged, irregularly nodular, stony-hard prostate, with shallow lateral sulci, the area of involvement, spreading laterally on one side or both, and into the region of the seminal vesicles, holds true.

Not infrequently, on rectal examination, one will feel a prostate not much enlarged, only slightly irregular and firm but not stony-hard. In these cases, one wonders whether the condition is one of infection; in other words, chronic prostatitis, or carcinoma. In such instances, x-ray examination of the bony pelvis and lungs should not be overlooked. Dr. Russell Ferguson of New York has devised a perineal punch procedure for obtaining prostatic tissue for examination. With the aid of a long aspirating needle he has been able to obtain tissue from isolated nodules in the prostate for diagnosis. Unfortunately, expert pathologists disagree, for diagnosis is dependent upon the cell.

Retention in patients with carcinoma of the prostate is usually late. Occasionally, a patient will complain of no other symptom than the retention. Frequently, however, pain in the back or along large nerve trunks, due to cancerous infiltration, is severe. Hematuria is not unusual. Advanced carcinoma of the prostate with little or no residual urine is by no means rare.

For relief of retention due to carcinoma of the prostate, authorities differ. The situation may be relieved of its acuteness by use of the indwelling catheter or suprapubic cystotomy, with decompression.

Later procedures may vary. At present three methods are used to afford relief.

There are those who believe that suprapubic cystotomy is all the surgery indicated.

Lately it has been proved that transurethral surgery is of a definite value here. The carcinomatous prostate cannot be surgically removed but the obstruction may be removed by means of transurethral excision. Furthermore, the portions of tissue excised are large enough for pathological section for diagnosis.

Recently Dr. R. S. Ferguson has perfected a method of interstitial radiation of the prostate.

Through a suprapubic cystotomy wound, radon seeds are placed with accurate spacing through the prostatic tissue by means of a retrograde seeding instrument.

Dr. Ferguson has been able to report some favorable results. One patient was observed over a period of six months. The suprapubic sinus closed in about five weeks, the residual urine was negligible, and the patient free from pain. Some five or six months later, when he was last seen, he appeared in good health and had gained 15 pounds in weight. The final chapter of this procedure is not yet written.

Finally there are several dissimilar conditions, which cause urinary retention, but cannot be classified in any definite age period.

Of these, trauma to the urethra is perhaps the most common. Straddle injuries, such as falling astride a fence; fracture of the pelvis with bony displacement and sharp edges of bone, tearing the urethra are common. The majority of these patients are surgical emergencies and therefore one does not often see them in acute retention. I remember but one. In this instance the shock, perineal and scrotal hemorrhage with severe pain, far outweighed the symptoms of retention. An external urethrotomy with insertion of a perineal tube into the bladder through the perineum, usually suffices, as the roof of the urethra in the large majority of cases is intact. However, in the above described case, the urethra and the entire bulb were torn across, and at operation the distal portion of the urethra was not found. In such instances, a suprapubic cystotomy is the best procedure. A soft rubber catheter may then be inserted through the cystotomy wound and fed through the internal meatus until it appears at the perineal opening. A suture of chromic catgut is fastened to the end of the catheter in the bladder, and allowed to protrude out of the cystotomy wound. One may sew the ends

of the urethra together, around the catheter, which has been fed along the urethra to the external meatus. A suprapubic tube is next inserted into the cystotomy wound, and the wound is closed.

The danger in such cases, if surgical interference is not immediate, is largely due to urinary extravasation, which usually manifests itself in a fulminating infection, spreading rapidly anteriorly and upwards over the lower abdomen, in accordance with the distribution of pelvic fascial planes.

Foreign bodies in the urethra are not uncommon. As causes of retention, they are quite often seen in conjunction with infection. In younger individuals reason for such an act is sexual excitement. Such articles, as nails, lead pencils, glass rods, to mention only a few, have been recovered. Many, though not all, of these patients are alcoholics of middle age.

Usually, if there is retention, the patient is able to void small amounts; the retention seldom, if ever, being complete. The patient focuses his attention on pain along the urethra, swelling in the perineum, and some pain with difficulty on urination. Infection is a serious complication and takes place early. One should not wait for the signs of inflammation, such as redness and swelling in the perineum, for the condition is by then far advanced, and unsightly, if not mutilating surgery may be the result. A few drops of foul smelling greenish brown pus, together with verification of a foreign body present (x-ray for foreign body should always be carried out) is sufficient ground for surgery. Generally external urethrotomy, through which the foreign body may be removed, with drainage of any existing infected area, is sufficient.

Occasionally, a stone impacted in the urethra may cause retention for a short time. Two such instances are brought to my mind. In both, symptoms referable to passage of the stone were the patients' primary concern. The retention was only of secondary importance. In one instance, the impaction was due to stricture. Progressive dilatation of the stricture was carried out; the stone meanwhile having been carried back into the bladder by instrumentation. Later, however, after urethral dilatation with large sounds, the calculus was passed with only slight difficulty. In the other instance a meatotomy was sufficient for passage of the impacted stone, and relief of the retention.

Contracture of the bladder neck has been found at varying age periods. Campbell reports ten in juveniles in the past three years. This condition is usually congenital in children.

I have seen one such condition, causing complete retention in an individual of twenty-three years of age. In this instance, no evidence of stricture was present. Drainage until such time as transurethral excision can be carried out is the method of choice. Diagnosis of course depends on cystoscopic examination.

An unusual and most interesting recent case in my private practice was a man, 37 years of age, who complained of inability to pass his water and when he was able to urinate, had much difficulty and complained of pain over the bladder region. The duration of the symptoms was two years. He also gave a history of two attacks of ureteral colic, left and right side respectively, two years ago. These attacks were two weeks apart and he passed a small stone per urethra after the last attack.

On physical examination the patient's bladder extended to within three fingerbreadths of the umbilicus. I had some difficulty in passing a No. 12 sound. A few minutes later he was able to urinate, but he had a residual urine (20 oz.) of a disagreeable odor.

X-ray showed ten large calculi in the bladder, some of them in diverticuli, and a calcified lymph gland.

The patient was a very bad surgical risk, and a suprapubic cystolithotomy was the only procedure attempted. On opening his bladder which was 1 cm. thick, there were six diverticuli, containing one or more stones. The bladder neck was thickened, the outlet very small.

The follow-up treatment consisted of irrigating his bladder once a day with 1-10,000 acraflavine, and dilating his urethra once a week. His condition is very much improved but further surgery is contemplated.

Retention caused by the neuropathies are not uncommon. Compression fractures resulting in cord trauma are not infrequent. Here, the history (except in obstetrical cases in infants) is easily obtained. The resulting paralysis of the extremities, with bladder distention, and urinary incontinence make up the usual picture.

Tabes dorsalis is a common cause of paralysis of the bladder. The characteristics of this condition are retention of urine with varying degrees of incontinence.

When tabes dorsalis is suspected of being the etiological factor causing retention, complete neurological examination is indicated. Occasionally the evidence pointing to a luetic basis is slight. Spinal Wassermann, or the Kahn test, is also indicated. Should a definite paralysis of the bladder be present, cystoscopic or urethroscopic examination will demonstrate an open bladder sphincter. Furthermore, the ocular end of the examining cystoscope will be depressed, due to loss of tone in the sphincter musculature of the bladder.

One point should be stressed here. The vast majority of patients suffering with tabes dorsalis are between the ages of thirty and fifty.

The condition is rare among children and only occasionally seen in young adults.

Differential diagnosis from prostatic hypertrophy is not always easy, but the fact that the first symptoms of tabes present themselves before the fiftieth year would, as a general rule, limit the age period fairly definitely for this condition. One would not besmirch therefore, the character of an old gentleman of three score and ten, who gives only a comparatively short history of urinary difficulty, with the label of syphilis. Similarly one would certainly be suspicious of a younger individual, whose prostate is not definitely enlarged per rectum, and whose reflexes show slight deviation from the normal. In such a case, serological and cystoscopic examinations are indicated. Here the problem of retention can be solved only partially at best.

During the World War, Colonel Besley proposed treatment of retention, due to cord injuries, by narcotics and manual pressure on the hypogastrium to squeeze out the contents of the bladder as nearly as possible. Keyes commends this treatment for paraplegics, whose associated anesthesia permits them to bear the distention of the bladder.

However, in spinal disease of civil practice, the bladder paralysis is slow to become complete, and the automatic bladder is therefore slow to establish its function. Catheterization, therefore, may be employed.

Urotropin and acid sodium phosphate āā gr. XV t. i. d. should be given to combat infection in patients with traumatic cord injury and retention.

In certain instances, suprapubic cystotomy is indicated. One must remember that in such cases, encrusted alkaline cystitis may be superadded to the infection and irrigation of the bladder with one per cent of phosphoric acid is of great value.

The situation is a trying one, to say the least.

Regarding retention in patients after operations, particularly on the upper urinary tract and abdomen, little need be said.

One point, however, should be stressed. Prior to operation, one should question the patient concerning venereal history or history of urinary difficulty. One should always do a rectal examination, particularly in elderly men. If this rule is followed, especially in patients who have reached the age of fifty or over, not a few will be found to be suffering from prostatism. I have found this to be true, much to my regret, on some few elderly patients, who had been operated on for hernia, sixteen to eighteen hours previously.

One sees, after an accident an occasional patient in retention (I do not believe that pain explains this condition entirely), for one sees this condition in patients with broken arms, and chest injuries. After the state of shock has passed off, they are usually able to void. Occasionally catheterization must be employed.

The time-honored treatments ordinarily suffice.

For the sake of completion, I will venture a word on anesthesia. For urethral instrumentation, I have made it a point of using no anesthesia whatever. By gentleness and careful manipulation one is usually able to succeed. Rather, I have learned to associate pain caused by urethral instrumentation, in the majority of instances, as due to the use of unnecessary force. Should anesthesia be necessary, sterile novocain up to ten per cent injected into the urethra, after irrigation, and held in for a few minutes, is sufficient. One should remember however, never to inject a local anesthetic into the urethra, once instrumentation has been tried. It should be remembered that the urethra is a delicate structure, and failure to observe this rule is likely to lead to untoward results or even death of the patient.

In all major surgery of the lower urinary tract, such as herein indicated, spinal anesthesia is by far the anesthesia of choice. Novocain crystals 50-60 mg. for the shorter operations is ample. Usually 120 mg. of novocain crystals, or the contents of one ampule, gives sufficient anesthesia for any of the above procedures. Spinal puncture for obtaining spinal fluid may be carried out in the usual site of puncture, namely, the third or fourth lumbar space.

Very little of the material contained in this paper has been gleaned from textbooks, which are ordinarily five years behind current procedures. Most of the data have been obtained from actual experience, or from individuals with whom I have been associated, either in training or actual practice.

The grouping of the usual causes of retention, according to age periods, has previously been stressed only indefinitely. By pocketing the various cases of retention into fairly definite age periods, the physician can rule out many puzzling allied conditions. There are, to be sure, exceptions to this rule, for I have seen stricture of the urethra due to Neisser infection in a child seven years of age, and conversely, marked phimosis almost severe enough to cause retention in an old man of seventy. These conditions are exceptions and all rules have exceptions.

In no other condition is the treatment so dependent on diagnosis. To enucleate an infiltrating carcinomatous prostate suprapubically is only to court disaster, and similarly it would be a tragic error to perform an external urethrotomy for stricture, when the retention is really due to prostate enlargement. I believe it was Keyes who formulated the axiom that one usually does not find an enlarged prostate

with stricture of the urethra; the opposite also holds true. I have, so far, seen only two exceptions.

In training and in practice, I have always tried to simplify the rapidly accumulating knowledge. And in my training and routine, I have found simple classification such as herein discussed, an exceptionally helpful guide in the labyrinth of an increasing detailed knowledge upon the subject, for

> The human mind forgets,
> For we but mortals be.
> Exactness lies in simplicity.

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MISCELLANY

NEW MEMBER

Dr. Walter J. Harrington, 814 Elm Street, Manchester, N. H. Graduated from Boston University School of Medicine in 1932. Licensed in 1933.

DEATH

Dr. Jane E. Hoyt-Stevens of Concord died July 1 of cerebral thrombosis and hemiplegia.

SEIZURES AND PROSECUTIONS UNDER FEDERAL FOOD AND DRUGS ACT

The Federal Food and Drugs Administration caused the seizure in July of 151 consignments of foods and drugs found to violate the national pure food and drugs law, according to W. G. Campbell, Chief. The Administration also sent to the Solicitor of the Department of Agriculture recommendations for prosecutions of cases involving 23 stocks of foods and drugs. Notification was received from Federal courts of the termination of 14 criminal prosecutions of violators, resulting in fines ranging from one dollar to $175.

Beer came into the food-and-drugs-law picture for the first time in many years when the Government seized 4,998 cartons of the beverage. The beer was partially decomposed, therefore adulterated, and subject to seizure under the pure food law.

Federal seizures in July, according to Mr. Campbell, included a wide variety of medicinal products recommended for such diseases as neuritis, pyorrhea, heart trouble, eczema, asthma, arthritis, rheumatism, and disorders of the stomach, liver, and kidneys.

Seizures also covered many misbranded or adulterated foods. These included large shipments of currants, pears, cherries, apple pomace and apple pulp which carried quantities of poisonous lead or arsenic sprays; as well as of butter deficient in fat; partially decomposed salmon, crab meat, shrimp, sardines; worm-infested fish; decomposed shell eggs and flour. Other July seizures covered a number of interstate shipments of drug preparations untruthfully labeled as being valuable in the treatment of disease of livestock.

During the month, the Administration caused the seizure of a considerable number of consignments of so-called "mineral crystals" which were recommended for a number of diseases for which they could have no value. One seizure involved packages of "Wonder Crystals." The crystals were labeled, in part, as follows: "It will cleanse the blood stream of poisons, neutralize acidity . . . it will promote elimination processes and assist the liver and kidneys to resume their normal functions . . . chronic constipation, Bright's disease, indigestion . . . cystitis . . ." On the ground that the crystals were falsely and fraudulently labeled for the cure of diseases named on the label, the Government seized the goods.

Another July seizure covered a number of boxes and bottles of Lydia E. Pinkham's tablets, shipped by Lydia E. Pinkham Medicine Company, Lynn, Mass., to a dealer in Baltimore, Md. Among the statements printed upon the label of the tablets were these: "Relief and prevention of monthly pains . . . does more than simply dull pain . . . suppression . . . and menstruation. . ." The Government alleged that the goods were falsely and fraudulently labeled.

Seven hundred and twenty-six 350-pound bags of frozen currants, which carried residues of lead spray, were seized in July.

Late in July, the United States Circuit Court, New York City, affirmed the judgment previously rendered by the Federal Court, Brooklyn, against three shipments of ginger jake which had caused paralysis of a large number of victims.

Other criminal prosecutions, terminated in July, resulted in fines against the following:

Daniel B. Morgan and Carol O. Sampson, trading as Morgan & Sampson, San Francisco, Calif., $60, for shipping interstate stocks of a misbranded tooth paste.

Mayo's Laboratories, Inc., Oklahoma City, Okla., three dollars and costs. The company's offense consisted of an interstate shipment of a so-called pyorrhea "remedy".—*Bulletin United States Department of Agriculture.*

CASE RECORDS
of the
MASSACHUSETTS GENERAL HOSPITAL

ANTE MORTEM AND POST MORTEM RECORDS AS USED IN WEEKLY CLINICAL-PATHOLOGIC EXERCISES

EDITED BY RICHARD C. CABOT, M.D.
F. M. PAINTER, A.B., ASSISTANT EDITOR

CASE 19331
A MEDIASTINAL MASS WITH PULMONARY COLLAPSE

MEDICAL DEPARTMENT

PRESENTATION OF CASE

DR. RICHARD B. CAPPS:* *First admission.* This is the case of a sixty-two year old white, single, furniture worker who first entered the hospital two years before his final admission complaining of cough of six weeks' duration.

Two months before admission he noticed a pain in his left chest which was increased by deep breathing. Six weeks before admission he developed a cough and began to raise a small amount of whitish sputum. He also had a sore throat and some hoarseness. He had lost about fifteen pounds in the preceding year and a half. Otherwise he had been perfectly well.

The past history was negative except for a chancre thirty years before admission.

Examination showed a thin old man with much recent weight loss. The chest showed a definite lag on the left side on breathing and dullness with distant breath sounds and distant bronchial breathing in front, low down, and in the base of the left axilla and the left base below the angle of the scapula. There was also diminished tactile fremitus. The heart seemed to be normal in size. The pulmonic second sound was greater than the aortic second. The blood pressure was 122/60, both sides. There was no tracheal tug and no abnormal pulsation.

Laboratory work showed a red cell count of 3,500,000, a white cell count of 17,000. Hinton and Wassermann tests were strongly positive.

X-ray showed a large dilatation of the descending aorta with collapse of the left lower lobe.

While in the ward he was given potassium iodide in small amounts. He was a little irrational. He was discharged unimproved.

History of interval. In the Skin Outpatient Department he was given antiluetic treatment, neoarsphenamin, bismuth and potassium iodide. He continued to complain of pain in the left lower chest and to have cough with a small amount of sputum. He said he had frequent colds. X-ray about a month before he died showed essentially the same thing as the first examination except that the heart was a little larger. Six weeks before his second admission he complained of increased pain and increased dyspnea on exertion. This gradually became so bad that he had to take to bed. He lived by himself in a single room, and apparently had no friends or relatives. He lay there and did not eat or drink to speak of. Someone gave him a glass of milk and some crackers about once a day.

Second admission, two years and a half after his previous discharge. When he was brought into the hospital he was extremely emaciated, breathing very rapidly, slightly cyanotic. The left lower lobe was dull, with diminished tactile fremitus and diminished breath sounds as before. Throughout the right chest and in the left upper lobe were occasional scattered râles. The white blood cell count was 34,000.

He remained in the ward for three days running a temperature of 102° to 103°. His white cell count went up to 43,000. In spite of digitalis, intravenous glucose and clyses he died after three days.

DR. GEORGE W. HOLMES: These films show the location of the aortic dilatation quite well, particularly in this oblique view, where you can see the fusiform dilatation of the descending aorta. You can follow the aorta over to the root, where the trachea passes under the aorta. At that point you get the dilatation.

This later film shows mottling in the right lung, which was not present in the earlier films. None of the films show any particular changes in the left lung except that it is much smaller than the right.

CLINICAL DISCUSSION

DR. HOLMES: It is quite possible that the aneurysm is pressing on the root of the left main bronchus so that it interferes with complete aeration there.

DR. TRACY B. MALLORY: That collapse was present in the earliest plates. It seems to have continued throughout.

DR. J. H. MEANS: Is there any significant change in the x-ray picture during the two years that he was observed? Have you any films from the first admission?

DR. HOLMES: There is very little difference.

DR. MEANS: This is a fusiform dilatation involving some six or eight inches of the aorta, rather than saccular, in all probability?

DR. HOLMES: Yes.

DR. CAPPS: He was discharged the first time with a diagnosis of aneurysm of the descending aorta and latent syphilis. We thought he probably had a bronchopneumonia.

The final discharge diagnosis was latent syphilis, aneurysm of the descending aorta, collapse of the left lower lobe, bronchopneumonia and malnutrition.

DR. MALLORY: Have you anything to add, Dr. Smith?

DR. WILLIAM D. SMITH: I think there is very little to add to the story. I suppose he had a good deal of atheroma as well as specific changes in the aorta.

*Recently senior interne on the East Medical service.

The long latent period following the primary sore, twenty-seven or twenty-eight years before he had any symptoms, is far longer than the average time in such a case. Further, he died as a great many patients with aneurysm do, not from rupture of the aneurysm but from general cardiac weakness. Whether or not the specific treatment that he had in the last two years did him any good is anybody's guess. I do not know.

CLINICAL DIAGNOSES (FROM HOSPITAL RECORD)

Aneurysm of the descending aorta.
Bronchopneumonia.
Starvation.

ANATOMIC DIAGNOSES

Syphilitic aortitis with aneurysm of the descending aorta.
Bronchial constriction, left lower lobe (possibly healed lues).
Pulmonary collapse, complete, left lower lobe.
Pressure upon the esophagus with slight displacement.
Chronic fibrous pleuritis, marked, left lower lobe.
Bronchopneumonia, right.
Arteriosclerosis, marked aortic, moderate coronary and renal.
Prostatic hyperplasia, moderate.
Leiomyoma of the bladder.
Fusiform dilatation of the ascending aorta, moderate.

PATHOLOGIC DISCUSSION

DR. MALLORY: The autopsy of course showed a very large fusiform aneurysm, as had been expected. The dilatation of the aorta started immediately above the valve ring, not involving it. It was relatively quite moderate in the ascending aorta and the arch, then became very marked in the descending and thoracic portions and stopped abruptly at the level of the diaphragm. There was no evidence of lues in the abdominal aorta.

The most surprising thing in the autopsy turned out to be the left lung. That, as you have been told, had shown more or less collapse for at least two years, restricted however to the lower lobe; there was no collapse in the upper lobe. It was difficult to understand how a diffuse fusiform aneurysm would cause this. It would seem as if the only thing that could be reached was the main bronchus to the left lung. There is no particular evidence of compression there. If it had been occluded we should have had a more or less uniform collapse of the entire lung, upper and lower lobes. When we opened the bronchi to the left lung the primary bronchus and the branch to the upper lobe were quite normal in size, but the branch to the lower lobe was relatively only a third as wide as normal for a distance of nearly a centimeter, then suddenly enlarged again to a normal diameter, so that there was quite sharply localized constriction a centimeter in length just at the beginning of the first bronchus to the lower lobe. The entire lower lobe was not only totally collapsed but showed a diffuse bronchiectasis, and in fact consisted of nothing but dilated small bronchioles and fibrous tissue with no grossly visible alveolar spaces left.

This section comes from the lower lobe of the left lung. The dilated bronchi filled with pus are much closer together than the normal on account of the collapse of the intervening lung substance. No alveoli can be recognized. There seems to be only vascular fibrous tissue, in which are numerous localized collections of lymphocytes surrounding the blood vessels.

This section is from the bronchus to the lower lobe. The bronchus itself appears to be normal. There is no evidence of any inflammatory process of its mucous membrane. In its adventitia, however, is this dense scar of fibrous tissue, with a little fat in places, which appeared as a more or less circular band surrounding and constricting the bronchus.

The one lesion that lues very commonly produces in the lung is stenosis of the bronchus. I am inclined to think that this case represents a real case of luetic stricture of the bronchus and that the aneurysm had nothing to do with the pulmonary collapse.

DR. HOLMES: Where did that lobe of the collapsed lung lie, on the diaphragm or against the mediastinum?

DR. MALLORY: It was firmly adherent to the aneurysm and the diaphragm both.

DR. HOLMES: I think we ought to be able to see it by x-ray.

DR. MALLORY: I am surprised it does not show more clearly. It is extremely dense; it must have been almost completely fibrosed for a matter of two or three years from its appearance.

Dr. Lord, have you any suggestions about the case?

DR. FREDERICK T. LORD: No; I think the explanation you offer seems to be the most plausible one. Syphilis affects the bronchopulmonary region, the bronchi or the trachea and not the lung in my experience. Except for Virchow's white pneumonia I do not know of any instance in the autopsy records of a pulmonary syphilitic process. Do you know of any case?

DR. MALLORY: I have seen one almost certain case that Dr. Leary had. A man who was run over by an automobile and killed something like eight or nine months after a primary lesion had diffuse gummata throughout his lung in which I believe spirochetes were demonstrated. No tubercle bacilli were found. That is the only case I have ever seen.

DR. HOLMES: This film was not shown before. There is a shadow which I cannot explain. It might be a collapsed lung. It is rather an unusual place for it.

DR. LORD: I think it is probable that the density from the collapsed lung was obscured by the shadow of the heart. The diaphragm is high and the interspaces narrow. The heart is displaced somewhat.

DR. MALLORY: I do not see why it should have completely obliterated the cavity. The upper lobe might come down that far.

DR. HOLMES: I think the upper lobe could come down and completely overlie the lower lobe.

The shadow of the collapsed lung must be in here somewhere. In this view the apex of the heart is above that. That shadow I do not know how to explain.

DR. LORD: There were no other scars in the trachea or bronchi?

DR. MALLORY: No, we found none, Dr. Lord.

CASE 19332

HEART DISEASE IN A SYPHILITIC PRIZE FIGHTER

MEDICAL DEPARTMENT

PRESENTATION OF CASE

DR. RICHARD B. CAPPS*: This is the case of a forty-two year old colored man, formerly a prize fighter, who entered the hospital complaining of pains in his knees and ankles of six weeks' duration.

Seventeen years before admission he had an attack of questionable rheumatic fever. Following that he seemed perfectly well and engaged in prize fighting. At one time he was the world's champion at 160 pounds, so apparently he was physically fit.

Eight years before entry he was seen in the Outpatient Department, having had a penile sore four months previously. At that time he had mucous patches in his throat, other signs of secondary lues and a strongly positive Wassermann. Examination showed the pupils fixed, generalized adenopathy and increased supracardiac dullness with an aortic diastolic murmur, the pulmonic second sound greater than the aortic second and a blood pressure of 130/50. He complained at that time of conjunctivitis. He was admitted to the Eye and Ear Infirmary and given treatment there. The eye condition was considered luetic. He was then treated in the Outpatient Skin L Room with arsphenamin, bismuth and mercury. Under treatment he was pretty well for five years. Wassermann and Hinton tests were negative for the first two years of treatment, weakly positive for the last two.

Three months before admission he was in bed for several weeks with cough, cold and sputum. He got up but did not feel very well. Two months before admission he had pain in his ankles and knees of indefinite character. Four weeks before admission he had some vomiting with some epigastric pain. Two days before admission he developed pain in his chest and palpitation, and noticed for the first time dyspnea on exertion. He had lost twenty-two pounds in the previous four months.

Examination at entry showed a large, well developed and well nourished Negro sitting up in bed in moderate respiratory distress. There were bilateral pea-sized epitrochlears. The heart was moderately enlarged, with a systolic and an early blowing diastolic at the base, and at the apex a systolic and low rumbling early and mid-diastolic murmurs. The aortic second sound was greater than the pulmonic second. The blood pressure was 148/0. An electrocardiogram showed moderate left axis deviation, normal rhythm. There was questionable early clubbing of the fingers. The mental condition was a little atypical. He was confused although oriented. It was felt that the mental condition was probably that of a so-called "punch drunk" prize fighter. His gait was rather shuffling. There was only slight swaying in the Romberg test. There was unsustained ankle clonus on both sides. All the reflexes were increased.

Laboratory work showed the urine to contain the slightest possible trace of albumin and occasional red cells on several examinations. The white blood cell count was 11,000. A lumbar puncture was negative.

X-ray showed the heart considerably enlarged, consistent with rheumatic heart disease.

While in the ward the patient ran a septic temperature. At first he was thought to have an upper respiratory infection. He gradually went downhill. After he had been there ten days the respiration went up and he developed signs which were consistent with either pulmonary infarcts or bronchopneumonia. The temperature and respirations were elevated. He died three weeks after admission.

DR. GEORGE W. HOLMES: The heart is considerably enlarged. It is wide across the auricles, so that in addition to the left ventricular enlargement he must have some other enlargement. In this oblique view with barium in the esophagus there is no marked enlargement of the left auricle, so there was more on the right than on the left. We get a fairly good idea of the diameter of the aorta, which may be a little enlarged but not strikingly.

CLINICAL DISCUSSION

DR. HOLMES: About all one is justified in saying from the x-ray examination is general enlargement of the heart with dilatation of the auricles, particularly the right, and possible slight dilatation of the aorta. That may be due to rheumatic heart disease. He has no very marked changes in the hilus shadows or definite evidence of anything in his lungs.

The portable film taken later shows an extensive process in his right lung, probably terminal pneumonia.

In a different view of his aorta we certainly have no evidence of aneurysm.

DR. CAPPS: Dr. Sprague saw the patient four days after admission and suggested subacute bac-

*Recently senior interne on the East Medical service.

terial endocarditis. Three blood cultures were positive for streptococcus viridans.

The discharge diagnosis was rheumatic heart disease with aortic regurgitation, subacute bacterial endocarditis, possible mitral stenosis, treated syphilis, bronchopneumonia and possible pulmonary infarcts. It was felt by some that there probably was a superimposed luetic aortic lesion, but the fact that on the first examination in the Outpatient Department he had had lues for only four months and yet had aortic regurgitation indicated that the aortic lesion was probably not luetic.

DR. WILLIAM D. SMITH: This is an interesting case. I remember I examined the patient previous to getting his history and felt perfectly sure that he had a syphilitic heart with aortic regurgitation and an Austin Flint murmur. His mental condition was perfectly compatible with paresis. When we got the history of rheumatism and the record of aortic regurgitation many years ago I was not quite reconciled, because it seemed to me improbable that a man could be a champion prize fighter with any such degree of aortic disease as he had. That apparently is the answer, however. Whether or not he had any overlying syphilitic condition I am sure I do not know.

DR. TRACY B. MALLORY: Have you anything to add, Dr. Sprague?

DR. HOWARD B. SPRAGUE: I think the note that I wrote covers what I thought about the case at the time. "Apparently the logic in this diagnostic problem would point to rheumatic heart disease with aortic regurgitation and perhaps slight stenosis. (The German literature contains reports of strenuous athletes with aortic regurgitation.)" I remember some years ago a report showing prize fighters and wrestlers who were found to have well marked aortic regurgitation and yet were able to carry on. This morning in the Outpatient Department I saw a boy with marked aortic regurgitation and some aortic stenosis who has been a football and basketball player for years. "There is probably slight mitral disease but no important stenosis, although there may be only ventricular dilatation. I feel that there must also be some luetic aortitis. There is suggestive slight clubbing of the fingers, sweating and fever. Subacute bacterial involvement of the aortic valve is likely."

I suppose I guessed at any luetic aortitis more on a statistical and racial basis than on anything very definite, although there was a suggestion of slight dilatation of the aorta.

CLINICAL DIAGNOSES (FROM HOSPITAL RECORD)

Rheumatic heart disease with subacute bacterial endocarditis.
Lues.

ANATOMIC DIAGNOSES

Rheumatic heart disease.
Subacute bacterial endocarditis, mitral and aortic.
Infarcts of the kidney and spleen.
Bronchopneumonia.
Arteriosclerosis, aortic, slight.
Old pleuritis.
Cardiac hypertrophy.

PATHOLOGIC DISCUSSION

DR. MALLORY: This question of the etiology of an aortic lesion is one on which as many mistakes are made as on any other single thing in cardiology. This case is an instance when it was hit right. It was a perfectly definite old rheumatic involvement of both the aortic and mitral valves, and there was a very marked relatively recent subacute bacterial endocarditis also involving both valves, particularly the mitral, where it had extended down on to the chordae tendineae and had ruptured several of them so that the aortic flap of the mitral valve had no stays at all.

We found no evidence of lues in the aorta or elsewhere in the examination. We were not allowed to examine the central nervous system so we cannot answer as to the possibility of paresis, although the time interval is very short for that, is it not?

DR. CAPPS: It was eight years.

DR. J. H. MEANS: Do you have rheumatic and syphilitic heart disease coexisting?

DR. MALLORY: Undoubtedly.

DR. MEANS: What about syphilitic heart disease and subacute bacterial endocarditis coexisting?

DR. MALLORY: I feel reasonably sure that I have seen that combination two or three times. It certainly is far less common than subacute on top of rheumatic disease and probably distinctly less common than subacute on top of congenital bicuspid aortic valve, but I feel quite certain that occasionally we do get that combination.

DR. HOLMES: Was the diameter of the aorta within normal limits?

DR. MALLORY: Yes, it is about at the upper edge of normal. The ascending aorta was eight centimeters in diameter. It runs from six to eight normally.

DR. EARLE M. CHAPMAN: I should like to ask on what evidence the clinical diagnosis of "punch drunk" was made. I understand that this man had not fought for some years.

DR. SMITH: In sanatoria we get a number of these people who do not have paresis but develop mental symptoms. It is said that 50 per cent of prize fighters if they keep at it long enough develop mental symptoms due to punctate hemorrhages and replacement gliosis, especially likely to affect the corpus striatum, with development of symptoms suggesting postencephalitic sequelae.

DR. MALLORY: Is a case of subacute bacterial endocarditis less apt to develop "cardiac psychoses" than an ordinary cardiac in a state of decompensation?

DR. SPRAGUE: I should say so.

The New England
Journal of Medicine

SUCCESSOR TO

THE BOSTON MEDICAL AND SURGICAL JOURNAL

Established in 1828

Published by THE MASSACHUSETTS MEDICAL SOCIETY under the jurisdiction of the

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SUBSCRIPTION TERMS: *$6.00 per year in advance, postage paid for the United States, Canada $7.04 per year, $8.52 per year for all foreign countries belonging to the Postal Union.*

Material for early publication should be received not later than noon on Saturday. Orders for reprints must be sent to the Journal office, 8 The Fenway.

The Journal does not hold itself responsible for statements made by any contributor.

Communications should be addressed to The New England Journal of Medicine, 8 The Fenway, Boston, Mass.

SUBACUTE COMBINED DEGENERATION AND PERNICIOUS ANEMIA

IT is generally accepted, at the present time, that subacute combined degeneration and pernicious anemia are either closely allied conditions or different manifestations of the same disease process. The anemia, however, does not produce the pathological changes in the spinal cord, nor does the degree of anemia in any way correspond to the nervous manifestations. The recent observations by Greenfield and O'Flynn* serve to emphasize the importance of the above statements, for these authors, as the result of the examination of forty-five cases of subacute combined degeneration, have noted that in all there were signs of gastric pathology and, in many, various degrees of anemia. In every instance a complete absence, on the first examination, of free hydrochloric acid in the gastric juice was found. Although the series of cases is not large, this finding is an important one and goes a long way toward confirming our idea that achylia gastrica is at least as constant in subacute combined degeneration as in pernicious anemia. Changes in the blood which would make a diagnosis of pernicious anemia justifiable were found in about half of the cases and in each of these the anemia conformed to the hyperchromic or Addisonian type. These statistics on the blood are about the average reported by other workers and indicate that in certain instances the disease may exert the greater part of its influence upon the spinal cord, leaving the hemopoietic system in a practically normal condition.

The authors, moreover, have been able to compare their postmortem material, during the last four years, with that in the preceding ten years, thus noting what effects, if any, liver treatment has had upon the pathological condition in the spinal cord. They find the commonest lesions in the posterior columns, a defect which usually preceded any destruction of the lateral columns. These observations correspond with the common clinical history that sensations of numbness and tingling, with some ataxia and loss of vibratory sense, may antedate by a year or more symptoms caused by pyramidal tract degeneration. Greenfield and O'Flynn suggest that liver therapy may exert its effect, in favorable cases, by retarding the development of degeneration of the lateral columns. Cases occurring in the last four years showed a higher percentage of absent pyramidal tract sclerosis, when compared with material from the ten years previous to 1929.

Clinically, one would expect, therefore, that, if paresthesia, ataxia, and loss of the appreciation of vibration were the principal findings, the prognosis with liver treatment should be relatively good. On the other hand, if there are signs of spasticity, with a positive Babinski reflex, caused by changes in the lateral columns, the chances for recovery under liver treatment are distinctly unfavorable.

In general, it would appear to be reasonable to assume, unless definitely proved otherwise, that all cases of subacute combined degeneration of the spinal cord are due to the same factor which causes pernicious anemia. When this point of view is reached, all patients with this disease with or without changes in the blood, will be treated with liver. In the past, too many patients have not been treated on account of the lack of changes in the blood, the diagnosis passing as chronic sclerosis of the spinal cord, or some other intrinsic degenerative disease, and considered not treatable. It should, moreover, be urged, as other authors have pointed out, that large amounts of liver be given to these patients, possibly whole liver rather than one of the extracts. The available evidence goes to show that much larger doses of liver are needed to abolish nerve symptoms than to raise the blood count to normal.

*Greenfield, J. G. and O'Flynn, Elizabeth. Subacute combined degeneration and pernicious anemia. The Lancet 2: 62, July 8, 1933.

RAPID GROWTH VERSUS LONGEVITY

EXPERIMENTS on the lower animals, both recent and antebellum, indicate quite clearly that rapid growth and early maturity are not compatible with longevity. The *New York Times* reports from *Science* the results of experiments which Dr. C. M. McCoy of Cornell has been conducting on rats and fish. Rats fed on a satisfactory diet mature rapidly and die relatively early; if their growth is retarded they mature at a later period and their lives are prolonged. A clearer relationship between the rate of growth and the span of life was found with brook trout, those that failed to grow living the longest, even though all in the school ate the same food.

Some years ago observations on captive fruit flies of the late Dr. Jacques Loeb, the rate of whose generation and the length of whose lives were influenced by temperature, showed that those kept in a cool temperature were smaller, matured more slowly and lived longer. It is unsafe, however, to draw any conclusions between cold and warm-blooded animals. Primitive tropical races we know mature early, have practically no period of adolescence, and rarely live long; the same is said to be true of the Eskimos, a confusing point.

The lives of most birds are short, but the wild goose is said to live sometimes over ninety years, and parrots are notoriously long-lived. A dog is old at twelve, a horse at twenty, yet elephants may reach the century mark; even among warm-blooded animals, regardless of size, the variations are tremendous and longevity between the different species seems to have little rhyme or reason unless it is based on a slow rate of development.

Conclusions are difficult to draw except that what data are offered seem to favor slow rather than rapid growth. In such a highly differentiated organism as man the results given above may not apply, and no matter how rapid growth may be, there is no evidence that it favors early maturation. It would be common sense, however, to pay less attention to the scales in determining the well-being of infants and children, and more to the general condition of health. Barring the degenerative diseases, the causes of which are so little understood and to some of which there seem to be family predilections, longevity is an inherited trait which we are as yet unable to explain or condition.

THIS WEEK'S ISSUE

CONTAINS articles by the following named authors:

SHATTUCK, GEORGE C. M.D. Harvard University Medical School 1905. Assistant Professor of Tropical Medicine, Harvard Medical School. Assistant Visiting Physician, Boston City Hospital in charge of the Service for Tropical Diseases. Address: Harvard Medical School, 240 Longwood Avenue, Boston. Associated with him is

HILFERTY, MARGARET M. A.B. Member of Department of Vital Statistics, Harvard School of Public Health. Address: 55 Van Dyke Street, Boston. Their subject is "Causes of Deaths from Heat in Massachusetts." Page 319.

MURPHY, WILLIAM P. A.B., M.D. Harvard University Medical School 1920. Instructor in Medicine, Harvard Medical School. Associate in Medicine, Peter Bent Brigham Hospital. His subjects are "The Diagnosis and Treatment of Pernicious Anemia" page 329 and "The Diagnosis and Treatment of Secondary Anemia" page 331. Address: 311 Beacon Street, Boston.

PHANEUF, LOUIS E. Phm.D., Ph.C., Sc.D. (Hon. Tufts) M.D. Tufts College Medical School 1913. F.A.C.S. Professor of Gynecology, Tufts College Medical School. Chief Gynecologist and Obstetrician, Carney and Malden Hospitals. Surgeon, Gynecological Department, Boston Dispensary. His subject is "Pelvic Infection in Women." Page 334. Address: 270 Commonwealth Avenue, Boston.

RICE, G. ARNOLD. M.D. Tufts College Medical School 1916. Ear, Nose and Throat Surgeon to Holden District Hospital, Holden, Mass., and to Holden Clinic, Holden, Mass. Bronchoscopist to Rutland State Sanatorium, Rutland, Mass. and to Worcester County Sanatorium, West Boylston, Mass. His subject is "Primary Carcinoma of Bronchus." Page 341. Address: Holden, Massachusetts.

WASHBURN, FRANK H. M.D. Tufts College Medical School 1899. F.A.C.S. Surgeon and Chief of Staff, Holden District Hospital. Thoracic Surgeon, Worcester County Sanatorium. Consulting Surgeon, Rutland State Sanatorium and Harrington Memorial Hospital, Southbridge. His subject is "What We Have Learned From Five Hundred Spinal Anesthesias." Page 345. Address: Holden Clinic, Holden, Massachusetts.

CHESLEY, HARRY O. A.B., M.D. Dartmouth Medical School 1898. President of the New Hampshire Medical Society 1932-1933. Member of Staff of Wentworth Hospital. His subject is "President's Address." Page 349. Address: Dover, New Hampshire.

DOYLE, PETER J. B.Sc., M.D., C.M., McGill University Faculty of Medicine 1928. His subject is "Urinary Retention: Outline of Causes and Treatment." Page 351. Address: Dover, New Hampshire.

COMPLETED CHART BY DR. S. C. DALRYMPLE AS EXPLAINED ON PAGE 312, ISSUE OF AUGUST 10
BRIGHT'S DISEASES

COMPLETED CHART BY DR. S. C. DALRYMPLE AS EXPLAINED ON PAGE 312, ISSUE OF AUGUST 10

BRIGHT'S DISEASES

	NEPHRITIS (Glomerular) (Endocapillaritis)			NEPHROSIS (Tubular Degeneration)	ESSENTIAL HYPERTENSION (Arteriolosclerosis)			NEPHRITIS (Other than Glomerular)			NEPHROSIS (Other than Chronic)				Benign Albuminuria	Arterio-sclerosis	Prostatic obstruction Hydro-nephrosis	Chronic Passive Congestion	Renal Decom-pensation	Pre-Renal De-viation of Fluid Normal Kidneys
	1 Acute (hemor-rhagic)	2 Chronic nephrotic phase	3 Chronic secondary contracted	4 Chronic (lipoid) (Epstein's)	5 Benign	6 Malignant	7 Primary Contracted	8 Multiple Glomerular Embolization in Subacute Bacterial Endocarditis	9 Focal Nephritis	10 Acute Inter-stitial	11 Larval febrile diabetic jaundice	12 Necro-tizing	13 Amyloid	14 Preg-nancy	15	16	17	18	19	20
Age	1	1	2	1	2, 3	2	3	any	1, 2	1	any	any	any		1	3	3	any	any	any
Edema	P I	P N	A or C	P N	A or C	A or C	A or C	A or C	A	A	A	A	A	P T	A	A or C	A or C	P C	P I, N, C	A, P C
Blood Pressure	E	N or E	E	N	E	E	E	N	N	N	N	N	N	E	N	N	E	N	N or E	N
Eye Grounds	N or P	N	N or P	N	N	P	N or P	N	N	N	N	N	N	P	N	N	N	N	N	N
Cardiac Hypertrophy	A or P	P	P	A	P	P	P	A	A	A	A	A	A	A	A	A	P	A	A	A
Urine Volume	D	D	E	D or N	N	D	E	N or D	D or N	N or D	D	D	E	N	N	N or E	N or E	D	D	D
Sp. Gr. Concentration	N or D	D	D	N	N or D	D	D	N or D	N or D	N or D	N	N then D	N	N	N	N or D	D	N	D	N
Phenolsulphone-phthalein	D	D	D	N	N	D	D	N or D	N or D	N or D	D	D	N or D	N	N	N or D	D	D	D	D
Urine Albumin	P	P	A or P	P	A	P	A or P	P	P	P	P	P	P	P	P	A	A or P	P	P	A
Hematuria	P	P	A	A	A	P	A	P	P	A or P	A	P	A	A	A	A	A	P	A or P	A
Casts other than Hyaline	P	P	A	P	A	P	A	A or P	P	A or P	A	P	P	A	A	A	A	P	P	A
Double Refrac-tile Lipoids	A	P	A	P	A	A	A	A	A	A	A	A	P	A	A	A	A	A	A	A
Urea Clearance	D	D	D	N	N or D	D	D	N or D	D	D	N	D	N	N	N	N or D	D	D	D	D
N. P. N.	E	E	N	N	N	E	N	N or E	N or E	N or E	N	E	N	N	N	N	N or E	E or N	E	E
Serum Protein	N	D	N	D	N	N	N	N	N	N	N	N	N	D	N	N	N	N	N	N
Secondary Anemia	A or P	P	A	A	A	P	A	A or P	A	A	A	A or P	A	A	A	A	A or P	A or P	P	P

MISCELLANY

ANOTHER HONOR TO DR. GEORGE R. MINOT

Dr. George R. Minot, Director of the Thorndike Memorial Laboratory of the Boston City Hospital, has been awarded the Moxon Gold Medal of the Royal College of Physicians at London.

Since graduation from the Harvard Medical School, in 1912, Dr. Minot has been a prominent investigator of diseases. He was also the recipient of the Cameron Prize awarded in 1930 in recognition of his work on primary anemia and the use of liver in treating this disease. This honor he shared with Dr. George H. Whipple of Rochester University by the award of the *Popular Science Monthly* prize in 1930.

In addition to his position of Professor of Medicine on the faculty of the Harvard Medical School, Dr. Minot is a Dean of the School of Medicine and Dentistry of the University of Rochester.

Boston is especially proud in having Dr. Minot represent the traditions of medicine in this locality.

RECENT DEATH

MORROW—William Robert Morrow, M.D., of 88 Irving Street, Framingham, Massachusetts, died August 6, 1933. He was born in Glasgow, Scotland, in 1864, and formerly lived in Burlington, Vermont. He graduated in medicine from the Dartmouth Medical School in 1889 and practiced for two years in Fairfax, Vermont, before moving to Framingham. He formerly served as chairman of the Framingham Board of Health. He is survived by his widow and a daughter Mrs. Elmer F. Gould.

NOTICE

REMOVAL

Sydney J. Allman, M.D., announces the removal of his office to 278 Humboldt Avenue, Roxbury.

REPORT OF MEETING

NORFOLK DISTRICT MEDICAL SOCIETY

At a special meeting of this Society which was held in the Roxbury Masonic Temple, Roxbury, Mass., August 8, 1933, and which was largely attended by the membership it was

Voted:

> That the Norfolk District Medical Society place itself on record as opposing The Greater Boston Hospitalization Plans A and B, and that our representative in the Committee on Public Relations of the Massachusetts Medical Society and our Councillors be instructed to oppose the same.

It was also voted:

> That the Norfolk District Medical Society in special meeting assembled offer to do all Schick testing and toxin-antitoxin service in the district during the coming school year, that the service will be free to those unable to pay and that the fee to those who are able to pay will be at a minimum rate and that a committee of three be appointed by the Chair to confer with the authorities in the District who have charge of this service.

Alexander S. Begg, M.D., *Pres.*,
Frank S. Cruickshank, M.D., *Sec.*,
1695 Beacon Street, Brookline.

SOCIETY MEETINGS, CONGRESSES AND CONFERENCES

September 11-15—The Twelfth Annual Scientific and Clinical Session of the American Congress of Physical Therapy will be held at the Palmer House, Chicago. Address the Executive Secretary, 30 North Michigan Avenue, Chicago.

September 13-14—Academy of Physical Medicine. Annual Meeting at the Palmer House, Chicago. Information may be obtained from the Secretary-Treasurer, Dr. Arthur H. Ring, 163 Hillside Avenue, Arlington, Mass.

September 16—The American Board of Otolaryngology will hold an examination in Boston just prior to the meeting of the American Academy of Ophthalmology and Otolaryngology. Prospective applicants for certificate should address the Secretary, Dr. W. P. Wherry, 1500 Medical Arts Building, Omaha, Nebraska.

September 19, 20, 21—The Connecticut Clinical Congress will meet at New Haven. Subjects for consideration: Diseases of the Blood, Diet in Disease, Industrial Injuries and Neuroses. Lectures, Demonstrations, Group Conferences.

September 25-30—The American Congress of Radiology will be held at the Palmer House, Chicago. For particulars write to Dr. Benjamin H. Orndoff, 2561 North Clark Street, Chicago.

September 29 and 30—New England Surgical Society at Boston.

October 9-12—The American Public Health Association will hold its sixty-second annual meeting at Indianapolis. For details on the scientific program write to the American Public Health Association, 450 Seventh Avenue, New York, N. Y.

October 9-13—The Clinical Congress of the American College of Surgeons will hold its twenty-third annual session at Chicago. Headquarters for the Congress will be at the Stevens Hotel.

October 13, 1933 - May 11, 1934—William Harvey Society. (Eight Lectures. Monthly.)

October 16, 17, 18—Massachusetts State Nurses' Association, Hotel Kimball, Springfield, Mass. For details write Helene G. Lee, R.N., 420 Boylston Street, Boston.

October 23 - November 3—The 1933 Graduate Fortnight of the New York Academy of Medicine. The theme during the two weeks of intensive study will be Metabolic Disorders. A complete program may be obtained by writing Dr. Frederick P. Reynolds, The New York Academy of Medicine, 2 East 103rd Street, New York City.

October 25-30—International Congress on the Scientific and Social Contest Against Cancer will be held at Madrid. For information address Dr. Julio Bejarano, Atocha, 104. Madrid, Spain.

October 28—The American Board of Dermatology and Syphilology will hold written examinations for candidates in the following cities: New York City; St. Louis, Mo.; Boston, Mass.; Cleveland, Ohio; San Francisco, Calif.; Philadelphia, Pa.; Chicago, Ill. Information may be obtained from the Secretary, Dr. C. Guy Lane, 416 Marlborough Street, Boston, Mass.

December 15 and 16—The American Board of Dermatology and Syphilology will hold oral examinations in New York City. Information may be obtained from the Secretary, Dr. C. Guy Lane, 416 Marlborough Street, Boston, Mass.

April 16-20, 1934—The American College of Physicians will hold its Eighteenth Annual Clinical Session in Chicago at the Palmer House. For information write Mr. E. R. Loveland, Executive Secretary, 133-135 South 36th Street, Philadelphia, Pa.

July 24-31, 1934—The IVth International Congress of Radiology will be held in Zurich under the presidency of Professor H. R. Schniz. General Secretary Dr. H. E. Walther, Gloriastrasse 14, Zurich.